
HOW TO GET PAID for Construction Changes

Preparation, Resolution Tools, and Techniques

Steven S. Pinnell

Pinnell/Busch, Inc.
6420 SW Macadam Avenue
Portland, OR 97239
503-239-6280
info@pinnellbusch.com

Library of Congress Cataloging-in-Publication Data

Pinnell, Steven S.

How to get paid for construction changes : preparation, resolution tools, and techniques / by Steven S. Pinnell.

p. cm.

Includes bibliographical references.

1. Construction contracts—United States. 2. Dispute resolution (Law)—United States

Library of Congress Control Number: 2010914118

ISBN 978-0-9828876-1-5

Copyright © 2010 by Steven S. Pinnell. Printed in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a data base or retrieval system, without the prior written permission of the publisher.

PINNELL ♦ BUSCH

6420 SW Macadam Avenue, Suite 330

Portland, OR 97239

503-293-6280

info@pinnellbusch.com

*Printed and bound by G&H Soho with assistance from
Stephanie Jackel and Printer's Ink.*

Pinnell/Busch books are available at special quantity discounts to use as premiums and sales promotions, or for use in corporate training programs. Professional articles on dispute resolution and other topics or past newsletters with technical information for both construction contractors and project owners and designers, are available free of charge for download from our website at www.pinnellbusch.com/library. For more information, please write, call, or email us at the address above. Or contact your local bookstore or Amazon.com.



This book is printed on recycled, acid-free paper containing a minimum of 50% recycled de-inked fiber.

Information contained in this work has been obtained by Pinnell/Busch from sources believed to be reliable. However, neither Steven S. Pinnell nor Pinnell/Busch guarantee the accuracy or completeness of any information published herein and neither Pinnell/Busch nor Mr. Pinnell shall be responsible for any errors, omissions, or damages arising out of use of this information. This work is published with the understanding that Pinnell/Busch and Mr. Pinnell are supplying information but are not attempting to render engineering or other professional services. If such services are required, the assistance of an appropriate professional should be sought.

To my brother, Tom.

Contents

| | |
|--|-----------|
| Preface | xi |
| Acknowledgments | xiii |
| List of Abbreviations | xv |
| | |
| Chapter 1. Introduction and Reader’s Guide | 1 |
| A. Introduction | 1 |
| B. Who Will Benefit from This Book and How | 2 |
| C. Goals and Objectives | 4 |
| D. Unique Features of This Book | 4 |
| E. Summary of Book Contents | 6 |
| F. How to Use This Book | 9 |
| | |
| Chapter 2. Background and Overview of Change Orders, Claims, and Dispute Resolution | 11 |
| A. Construction Industry Trends Affecting Disputes and Claims | 11 |
| B. The Dispute Management Program—What It Is and What It Can Do | 15 |
| C. A Partnering Approach to Change Order Requests and Claims | 16 |
| D. Key Elements for Successful Change Order Requests and Claims | 20 |
| | |
| Chapter 3. Overview and Practical Understanding of Contracts and Contract Law | 27 |
| A. Requirements for Recovery | 28 |
| B. Elements of the Contract | 32 |
| C. Fundamentals of Contracts and Contract Interpretation | 42 |
| D. Other Legal Concepts and Terms | 50 |
| E. Contract Clauses Affecting Change Order and Claims Resolution | 51 |
| F. Types of Extra Costs and Damages—Based on Entitlement | 71 |
| G. How to Proceed if Unable to Negotiate a Settlement | 77 |
| | |
| Chapter 4. How to Develop and Implement a Change Order Management Program | 79 |
| A. Purpose of a Change Order Management Program | 80 |
| B. How to Establish a Change Order Management Program | 80 |
| C. Recordkeeping and Reporting Procedures and Forms | 84 |
| D. Prebid Phase Risk Management | 111 |
| | vii |

viii Contents

| | |
|---|------------|
| E. Preaward Phase Constructibility Review and Risk Management | 114 |
| F. Implement Partnering and Retain a Project Neutral | 121 |
| G. Construction Phase Change Order Management | 123 |
| Chapter 5. Preparing and Settling Change Order Requests | 129 |
| A. The Changes Clause and Related Contract Provisions | 129 |
| B. How to Prepare a Change Order Request (COR) | 130 |
| C. How to Improve Settlement of Change Order Requests | 152 |
| Chapter 6. Phase 1—Selecting Claim Preparers | 157 |
| A. Qualifications for a Successful Claims Preparer | 157 |
| B. Deciding Who to Use to Prepare a Claim | 160 |
| C. Selecting a Consultant Expert | 161 |
| D. Overseeing the Expert and Managing Claim Preparation | 163 |
| Chapter 7. Phase 2—Preparing Preliminary Claims Analyses, Dispute Review Board Presentations, and Small Claims | 167 |
| A. Why Make a Preliminary Analysis before the Detailed Analysis | 168 |
| B. How to Prepare a Preliminary Analysis | 170 |
| C. Optionally, Attempt to Settle the Claim | 183 |
| D. Dispute Review Boards and Neutral Experts | 185 |
| E. How to Prepare a Simplified Claim | 186 |
| Chapter 8. Phase 3—Obtaining and Organizing Documents for Review | 191 |
| A. Obtaining and Copying Documents | 191 |
| B. Assisting with Discovery | 204 |
| C. Organizing the Files | 206 |
| D. Interviewing Project Participants and Technical Experts | 210 |
| E. Visiting the Site | 213 |
| Chapter 9. Phase 4a—Determining the Facts and Analyzing Entitlement | 215 |
| A. Strategy and Perspective | 215 |
| B. Using Narrative Text to Organize and Analyze Facts and Entitlement | 217 |
| C. Determining the Facts and Analyzing Entitlement | 226 |
| D. Dealing with Common Problems | 243 |
| E. Countering Owner Defenses and Defending against Counterclaims | 248 |
| Chapter 10. Analyzing Schedule Delay and Acceleration | 253 |
| A. General Introduction and Overview of Project Management Concepts | 254 |
| B. Construction Scheduling Practices, Problems, and Solutions | 259 |
| C. Critical Path Scheduling Concepts, Techniques, and Tools | 263 |
| D. Timescale Arrow Diagrams | 284 |
| E. Schedule Analysis Procedures | 288 |
| F. Schedule Analysis Issues | 303 |
| G. Detailed As-Built Schedules | 311 |

| | |
|---|------------|
| H. ELIPSE Schedules—A New Tool | 319 |
| I. Other Tools for Scheduling Analysis and Exhibits | 323 |
| Chapter 11. Phase 4b—Computing Damages | 333 |
| A. General Comments and Suggestions | 334 |
| B. Bid Estimating Procedures and Their Effect on Damage Calculations | 338 |
| C. Cost Accounting Procedures and Their Effect on Damage Calculations | 342 |
| D. How to Compute Damages and Equitable Adjustments | 346 |
| E. Calculating Direct Costs | 356 |
| F. Computing Compensable Delay Costs | 365 |
| G. Identifying and Computing Impact Cost | 371 |
| H. Computing Other Types of Damages | 373 |
| I. Adding Markup | 374 |
| J. Listing Below-the-Line Costs (Other Sums Due) | 376 |
| K. Preparing a Cost Summary | 378 |
| Chapter 12. Proving Inefficiency | 383 |
| A. Assessing Productivity and Inefficiency | 384 |
| B. Proving Causation | 393 |
| C. Using Rational Analysis to Prove Inefficiency | 396 |
| D. Total Cost, Modified Total Cost, and Cost Plus Methods | 400 |
| E. Measured Mile Method and Learning Curve Adjustment | 401 |
| F. Interview, Survey, and Expert Opinion Methods | 403 |
| G. Construction Industry Productivity Study Methods | 404 |
| H. Work Improvement Methods | 414 |
| Chapter 13. Phase 5—Preparing Exhibits and Assembling the Claim | 427 |
| A. Introduction and Overview | 427 |
| B. Writing, Graphics, and the Human Element | 431 |
| C. Finalizing and Polishing the Claim Document | 437 |
| D. Preparing Exhibits | 444 |
| E. Including Subcontractor and Supplier Claims | 452 |
| Chapter 14. Phase 6—Presenting the Claim and Negotiating an Equitable Adjustment | 455 |
| A. General Principles, Style, and Strategy for Negotiators | 455 |
| B. Human Behavior—Personality Styles, Conflict, and Communication | 462 |
| C. Preparing for Negotiation—Issues, Personalities, and Position | 473 |
| D. The Initial Presentation | 479 |
| E. Follow Up | 483 |
| F. Negotiations—Style, Strategy, Tactics, and Procedures | 484 |
| Bibliography | 503 |
| Index | 505 |
| About the Author | 520 |

Index

A page number appearing in **boldface** type indicates that an illustration appears on that page.

- acceleration, 73, 149-150, 254-256, 262, 289, 306, 355, 387, 405
- acceptance of project, 67-68
- access, 75, 119-120, 390-391
- accounting (See cost accounting)
- Act of God intervention in contract performance, 47, 72
- activities, CPM, 264, 269
- activity-based accounting, 344-345
- actual cost, 136, 354
- addenda to bid documents, 36
- after-the-fact pricing of changes, 346, 351-353
- AGC standard subcontract, 39
- agendas, rosters, minutes of meetings, 94-95
- alternative change order agreements, 140
- Alternative Dispute Resolution (ADR), 14, 15-16
- ambiguity in contract wording, 44-45, 114
- American Arbitration Association (AAA), 12
- American Institute of Architects (AIA), 34, 37
- approval of performance, 47, 67-68
- arbitration, 5, 6, 12, 14, **16**, **29**, 64, 77, 501
- architects/engineers, risks and responsibility, 13-14, 46, 57-58, 74, 115-116, 123-124
- arrow diagrams, 271-273, **272**, **275**, 285-288, **288**
- as-built drawings, 68, 109
- as-built schedules, 294-296, 312-320, 314, 316, 446-447
- as-planned schedules, 291-294, 445-446
- Associated General Contractors (AGC), 13, 34, 39, 414
- attorneys, 2, 28, 50-51, 161, 162
- audits of troubled projects, 125
- awards, 31

- backcharges, 38, 76
- backward pass, CPM, 269, 277-278, **277**
- banded comparison charts, 324-326, **325**
- bar chart scheduling, 264-268, **265**, **266**, **267**, **268**
291-292, **292**, 326
- below-the-line costs, 356, 376-378

- beneficial occupancy (See substantial completion)
- bid practices affecting claims, 338-341
 - catalog estimates, 340
 - composite crew/productivity estimates, 341
 - computer estimating, 341
 - costing methods, 339-341
 - errors in bidding, 341
 - manual-based estimating, 340
 - market-based bid estimating, 340
 - plug numbers, 340
 - prebid reviews, 111-114
 - subcontractor quotes, 341
 - systems unit cost estimates, 340
 - unit cost estimates, 339
 - unit price estimates, 339
- Blue book for equipment rates, 361
- body language in negotiating, 368-370
- bond claim, Miller Act, 32
- bonding, 32, 50, 376
- brainstorming sessions, 212-213
- breach of contract, 47-49

- cardinal change, 63
- case law (See common law, contracts)
- cash allowance specification, 41
- cash flow forecasts, 256-259, 326-328, **327**, **329**
- cash-based accounting, 343-344
- causation, proof of, **29**, 30, 237-238, 335-336, 38-393, 393-396
- cause/effect (See causation)
- certification of claims, 70-71, 431
- change in working conditions (See also impact), 370, 372
- change order management program, 21-22, 79-127
 - agendas, rosters, minutes of meetings, 94-95
 - audits of troubled projects, 125
 - communication, 123-124
 - conflicts in coordination, 119-120
 - constructibility review, 114-121

- change order management program (*Cont.*):
 construction phase procedures, 123-127
 contract documents, 33-36, 109
 correspondence and transmittals, 94-96, 196, 244
 cost accounting reports, 108, 197, 204, 342-346
 client satisfaction, 127
 daily reports, field supervisor, 88-92
 design errors, 51-58, 74, 115-116
 diaries, daily diary of work, 92
 direct support costs, 141-143, **143**, 152-153
 dispute review board (DRB) 77, 121-122, 185-187
 documentation/recordkeeping, 79-82, 84-111, 136,
 191-214, **192**, 217, 243-246
 drawings and submittals, 35, 109, 117-118, 452
 e-mail, 96, 203
 estimating and cost accounting systems, 81, 108,
 142-151, 194, 338-346
 extra work orders (daily force account/time &
 materials) records, 100-103, 101, 108
 facsimiles, 96
 goals and objectives, 79-80
 identification of extra work, 124-125
 issue files, 103
 logs of data (RFIs, CORs, etc.), 103-108, **104**, **108**
 loss prevention plan, 53, 67, 112-113
 meeting minutes, 94-95, **95**
 memos, 97
 neutral experts, use of, 122
 notes of conversations, 95
 notice of extra work, 60-61, 124-125
 organizing documents for review, 109-110
 owner communication, 124
 partnering approach, 84, 121-122
 permits/regulatory rules, 118
 photographs/videotapes to show progress, 92-94
 policy and procedure development, 80-84
 preaward constructibility review, 114-121
 prebid reviews, 84, 111-114
 preconstruction review of plans, 84, 111-121
 progress payment requests, 68-69, 109, 337, 402
 recommended procedures, 80-84
 reporting procedures, 81-82
 reports to company management, 110-111
 requests for information (RFI), 97-99, **99**, 106-107,
107, 125
 resolving disputes, 126, 484-500
 scheduling (*See also*), 92, 253-332
 specifications and drawing errors, 116-118
 speed memos, 97
 status reports to management, 110-111, **110**
 subcontractors (*See also*), 75-76, 110, 121, 123-124,
 310-312
 submittal log, 104-106, **104**
 telephone record notes, 95-96, **96**
- change order management program (*Cont.*):
 timecards, 86-88
 training programs for personnel, 83
 value engineering, 65, 114, 120-121
 varied procedures for various projects/owners, 84
 change order proposals (COP), 129
 change orders and change order requests (CORs) (*See*
 also claims preparation; cost analysis), 20-26, 36,
 51-52, 61-64, 79-155, 431
 adverse interest of owner's reviewer, 23
 after-the-fact pricing, 351-353
 agreement form for change order, 140
 authority to direct changes, 61
 change order agreements, 61, 140
 changes clause, 61-64, 129-130
 communication, 22-23, 189, 431-437, 466-471
 constructive change, 63
 contingencies, 151, 348-349, 378
 contract compliance when making claim, 21
 cost of preparation/negotiation, 141-142, **143**, 151,
 319-320, 373-374
 credit for defective/incomplete work, 62
 deductive changes, 62, 151
 define scope of changes, 133, 137
 delays, 149-150
 direct support costs, 141-143, **143**, 152-153
 disputes clause, 64-65, 130
 documentation/recordkeeping, 84-111
 entitlement, 30, 71-76, 132, 140, 215-252
 estimating costs, 140-152, **143**, **144**, **147**
 estimating forms, 142-148
 exhibits, 140, 444-452
 extra work order, 136-141
 force account pricing, 135-136, 349-351
 forms for change order requests (CORs), 136-141, **138**
 forward pricing, 346-349
 home/jobsite office costs, 139-142, **143**, 150-153,
 365-368
 impact of change, 63, 139, 149-150, 337, 371-373,
 383-425
 inadequate markup for change orders, 62
 insurance costs, 139
 key elements for successful change requests, 20-21
 key people involved in change orders, 2, 23-24
 markup, 137-140, 150-151
 negotiated change orders, 22, 24, 133-135, 151-152
 outside scope of contract, 62
 overhead (*See also*), 139, 140, 142, **143**, 150-153
 partnering approach, 5-6, 15-20, 22, 28
 prebid review to identify problem areas, 111-114
 provide more detail, 153, 334-335
 protest, work under protest, 63, 135
 quantum meruit changes, 30, 63
 multiple-changes inefficiency, 411-413, **412**

- change orders and change order requests (CORs) (*See also* claims preparation; cost analysis) (Cont):
 recommended procedures, 25-26, 130-152, **131**, 164,
 requests for equitable adjustment (RFEA), 129
 resolving disputes, 20-26, 152-155
 satisfying customers, 26
 scheduling (*See also*), 134, 137
 settling requests for change, 22, 151-153, 455-501
 seven steps to successful changes, 21-26
 subcontractors, 37-39, 75-76, 121, 133, 141
 submitting the change order, 134, 151-152
 time extensions, 63
 time impact analysis, 148-149, 301-302, **303**
 timely notice and submittal, 24-25, 124-125, 153
 total cost/modified total cost claims, 63-64, 354
 trading agreement (undocumented changes), 64
 training personnel in preparing change orders, 152
 understanding other interests, 22-23
 unilateral change orders, 50
 unit price payment, 41, 339, 353-354
 value engineering changes, 65
 written change orders, 61, 64
- changed conditions (*See* differing site conditions)
- changes clause, 61-64, 129-130
- chronological summary notes, 174, 178-179, 220-221,
 231-235
- claims consciousness, 12-13
- claims preparation (*See also* exhibit preparation;
 change orders and change order requests
 (CORs); scheduling; cost analysis; narrative
 text), 153-155, 157-501
 access, 75, 119-120, 390-391
 addressing the claim reviewer, 22-24, 429-431
 appendices to claim document, 444
 assemble document, recommended procedures, **428**
 cardinal change, 63
 certification of claims, 70-71, 431
 consultant vs. in-house expert, 160-163, 165
 contractor error, 71-72, 247, 249
 cost of preparing claims, 159, 346, 373-374
 cost plus claims, 42, 63, 64
 counterclaims by owner, 76, 239-240, 250-251
 design errors, 57-58, 74, 115-116, 388
 documentation (*See also*), 184, 217-224, 231-235,
 241-242, 427-452
 detailed as-built schedule 56, 90, 180, 231-235, **233**,
 247, 249-250, 294-296, 312-320, **314**, **316**,
 executive summary of claim, 440
 exhibit preparation (*See also*), 441-442
 fact finding section (*See also* fact finding &
 entitlement analysis), 441-442
 federal contracts (*See* public works contracts)
 flow chart of how to get paid, **155**
 format of claim document, 439
- claims preparation (*See also* exhibit preparation; change
 orders and change order requests (CORs);
 scheduling; cost analysis; narrative text) (Cont.):
 graphics, illustrations, 189, 435-437
 human element in good preparation, 159, 431-43
 impact, 63, 139, 149-150, 337, 371-373, 383-425
 issues to be addressed, 429-431, 442
 modified total cost claim, 63-64, 186-187, 354, 400
 multiple-changes inefficiency, 411-413, **412**
 narrative text as claim document, 438-439
 outline of claim document, 437-438
 overseeing and managing claim preparer, 163-165
 packaging the claim document, 189, 439-440
 polishing the claim document, 437-444
 preliminary claim analysis, 163-183, **171**
 preparer selection, 157-163
 qualifications for preparing claims, 157-159
 recommended procedures, **155**
 schedule analysis (*See also* scheduling), 442
 seven steps to success, 21-26
 simplified approach, 186-190
 source documents, citing references, 442-445
 subcontractor claims (*See also* subcontractors), 452
 submitting claims, 64, 479-483
 successful claims elements, 428-429
 supplier claims (*See also* purchase orders; suppliers),
 452
 team vs. individual, advantages, 159-160
 timely presentation of claims, 24-25, 153, 459-461
 total cost/modified total cost claims, 63-64
 training experts for claim preparation, 160-161
 understanding all points of view, 429-431
 writing skills, 433-435
- claims preparers 157-165, **162**
- clarifications (*See* requests for information)
- clauses in contracts, 51-71, 112-113
- closeout of project, 67-68, 126-127
- CM (construction management), 13, 42
- CM/GC or CM/GMP form of contract, 42
- collaborative problem solving, 84
- common law (case law), 36, 43, 66
- communication skills (*See also* documentation/
 recordkeeping), 22-24, 95-99, 159, 189, 431-437,
 466-471
- compensable cost or delay, 73-76, 300, 364-371
- competitive pressures, 11-12
- completion and acceptance of project, 67-68, 126-126
- compliance, strict vs. substantial, 47
- composite crew/productivity estimates, 334-335, 341,
 363-364, **363**
- computer records, 199, 202-204, 210
- computerized scheduling, 262-263, **288**, 292, 311, 315,
316, 448
- concurrent delay, 56, 73, 248-249, 304

- conflict
 - avoidance, **15**, 16-20, 125, 457
 - resolution (*See* resolving disputes)
 - spatial, 119-120
- consequential damages, 251
- constrained dates, 280-283
- constructibility review, problem areas, 114-121
- construction contracts (*See also* contracts), 32-36
- Construction Engineering Research Laboratory (CERL), 203
- constructive changes, 63
- consultants, 32, 160-163, 165
- contingencies, 151, 348-349, 378
- contract delivery methods (contract forms), 13
- contract documents, 33-36, 109
- contractor error, 71-72, 249-252
- contractors' liabilities, risks, and responsibilities, 12-13, 19, 72
- contracts, 3-4, 13, 27-71, 109, 172, 176
 - Act of God intervention, 47, 72
 - addenda to bid documents, 36
 - administration of contract, 60
 - AGC standard subcontract, 39
 - AIA Document A201 contract general conditions, 34
 - ambiguity in contract wording, 44-45, 140
 - American Consulting Engineers Council (ACEC), 34
 - American Public Works Association (APWA), 34
 - American Society of Civil Engineers (ASCE), 34
 - approval of performance, 47
 - arbitration, 64-77
 - architect/engineer liability/risk/responsibility, 13, 46
 - Associated General Contractors of America (AGC), 34, 39, 414
 - attorney work product, 50-51
 - attorney-client privilege, 50-51
 - award of contract, 116
 - bidding requirements, 33
 - bonding, 32, 50
 - breach of contract, 47-49
 - cardinal change, 63
 - change orders (*See also*), 21, 36, 51-52, 61-64
 - changes clauses, 61-64, 129-130
 - claims preparers' knowledge of, 158
 - clauses in contracts, 51-71, **52**
 - CM/GC or CM/GMP form of contract, 42
 - common law used to interpret contracts, 36-37
 - conditions of contract, 33-34
 - construction contracts, 32-33
 - construction management (CM) contracts, 13, 42
 - Construction Specifications Institute (CSI), 34
 - contract price, 41-42
 - cooperation and coordination clause, 56-57
 - cost plus contracts, 42
 - damages (*See also* damages), 31, 48
- contracts (*Cont.*):
 - defective plans/specifications (*See* design errors)
 - defense, indemnity, and hold harmless clauses, 68
 - delays (*See also*) 66, 71-76
 - design contracts, 32, 33
 - design/build contracts, 13, 33
 - differing site conditions clause, 59-60, 74
 - disclosure, 49
 - discovery, 50-51
 - disputes clause, 64-65, 130
 - documentation, 109
 - drawings, 35, 39-40, 58, 109, 111-122, 452
 - duty to proceed if dispute, 65
 - EJCDC standard contract documents, 34
 - elements of contract, 33-36, 43
 - enforcement of contracts and awards, 31-32
 - entitlement, 30, 71-76, 140, 215-242
 - environmental clauses, 70
 - equitable adjustment, 30, 31
 - equity, 37
 - exculpatory disclaimers, 59
 - excuses for nonperformance, 47-48
 - Federal Acquisition Regulations (FARs), 36, 473
 - firm fixed price contracts, 41
 - flow down provisions, 37
 - fraud, 48
 - fundamentals of contracts, 42-50
 - general conditions of contract, 33-34, 116-117
 - general contractor (GC) contracts, 13, 33-36
 - general contractor claims against subcontractor (*See* backcharges)
 - guaranteed maximum price (GMP) contract, 42
 - hold harmless clauses, 68
 - illegal terms in contracts, 47, 49
 - implied contracts, 38
 - impossibility of performance, 47, 49
 - indemnity clauses, 68
 - industry practices, effect on contract, 46
 - inspections, 60, 67-68, 74
 - intent clauses and design errors, 57-58
 - interpreting contracts, 44-46, 59
 - liens, 32, 37-38, **50**
 - liquidated damages, 70, 250-251
 - litigation, 64-65, 77
 - lump sum contracts, 41
 - mediation, **5**, 14, **16**, **29**, 77, 501
 - Miller Act (Little Miller Act) bond claim, 28, 32, 50
 - mitigate damages, 56, 60, 67, 113
 - modification of contract, 36-37, 61-64
 - multiple prime contract coordination clauses, 57
 - National Society of Professional Engineers (NSPE), 34
 - no damages for delay clause, 66-67
 - notice requirements, 60-61, 124-125
 - omissions (*See also* design errors), 57

- contracts (*Cont.*):
- oral contracts, 44, 45
 - partnering rights, 20
 - pass through of subcontractor claims, 37
 - patent vs. latent ambiguity, 45
 - pay-if-paid clause, 69
 - pay-when-paid clause, 59
 - payment terms, 67-69
 - performance of contract, 46-48
 - performance specifications, 41, 58-59
 - prebid review, 111-114
 - preparing contracts, 32-45, 50
 - preserving contract rights, 49-50
 - privity of contract, 37-38, 46
 - progress payment clauses, 68-69
 - protest, work under protest, 63
 - public works contracts, 34, 36, 84, 431
 - punch list completion, 67-68, 126-127
 - purchase orders, 32, 39, 198-199
 - quantum meruit, 30, 63
 - reference standard, 41, 58
 - reports, studies, tests 36, 109, 194, 198, 243-244
 - requirements for recovery, 28-32, **28**
 - resources/books on contract preparation, 50
 - scheduling requirements, 54-56, 66, 92, 259
 - Severin Doctrine, 38
 - specific performance, 48
 - specifications, 34-35, 40-41, 58-59
 - state and federal laws supersede contracts, 36, 66-67
 - statutes (*See* state and federal laws . . .)
 - strict vs. substantial compliance, 47
 - subcontracts (*See also*), 37-39, 121
 - substantial completion, 47
 - substantial performance, 46-47
 - subsurface conditions, 59-60, 70, 74
 - supply contracts (*See* purchase orders; suppliers)
 - suspension of contract, 65-66
 - terminating contracts, 48-49, 65-66
 - time and materials contracts, 42,
 - time extensions (*See also* scheduling), 66
 - time of performance (contract duration) 47
 - trade practice (usage of trade) concept, 46
 - trading agreements (undocumented changes), 64
 - types of contract, 32-33
 - unenforceable clauses, 114
 - unit price contracts, 41
 - value engineering change proposals (VECPs), 65, 120-121
 - variations in quantities, 41-42, 69-70, 353-354
 - waste of economic resources, 47
- coordinating with others, 56-57, 75, 119-120
- copying documents, 199-201
- Corps of Engineers (*See* U. S. Army Corps of Engineers)
- correlation, 245, 335, 395-396
- cost accounting, 81-82, **82**, 108, 197, 204, 342-346
- cost analysis (*See also* damages), 81, 132-151, 197, 204, 333-382, **382**
- acceleration, 73, 148-150, 254-256, 262, 405
 - activity-based-accounting, 344-345
 - actual cost, 48, 136, 354
 - additional overhead, 373
 - after-the-fact pricing, 346, 347, 351-353
 - Allegheny formula, extended overhead (*See* Eichleay)
 - audits for projects, 125
 - backcharges to subcontractor, 76
 - below-the-line costs, 356, 376-378
 - bid estimates, 81, 194, 338-341
 - calculating damages, 3334-335, 346-356, **347**
 - Carteret extended overhead formula (*See also* Eichleay), 368
 - cash flow forecasts, 256-259, 326-328, **327, 329**
 - cash-based vs. accrual accounting, 343-344
 - catalog estimates, 340
 - change in working conditions, 370, 372
 - change order preparation/negotiation costs, 151, 319-320, 373-374
 - change order requests (COR) (*See also*) 129-155
 - compensable delays, 73-76, 300, 364-371
 - composite crew/productivity estimates, 334-335, 341, 363-364, **364**
 - computer estimating, 341
 - consequential damages, 251
 - contingencies, 151, 348-349, 378
 - cost accounting procedures, 108, 342-346
 - cost category analysis, 336
 - cost codes by CSI division, 336
 - cost plus claims, 64, 400-401
 - cost summary preparation, 378-381, **379, 380**
 - cost-time tradeoffs, 255-259, **256**
 - costing methods, 339-341, 346-354
 - credit for nonconforming/unsatisfactory work, 62, 378
 - deductive change orders, 62, 151
 - delay costs, (*See also* delays), 149-150, 364-371
 - direct costs, 355, 356-364
 - direct support costs, 141-142, 152-153
 - earned value, 256-259, 257, 326-328
 - Eichleay formula for extended overhead, 366-368
 - elements of damages, 354-356
 - equipment costs, 102, 336-337, 361-362, 369
 - equipment reports, 343
 - escalation costs/factors, 368-369
 - estimating costs, 136-152, **144, 147**, 333-425, **363-364**
 - exhibits, 449-450
 - expendables (consumables) costs, 363
 - extra work orders (*See* force account)
 - financing costs (*See also* interest expenses), 370
 - fixed cost, 69-70, 367, 375, 493

- cost analysis (*See also* damages) (*Cont.*):
 force account pricing, **347**, 349-351
 forward pricing, 246-349, **347**
 fringe benefits, labor costs, 357-358
 general conditions of contract, 33-34, 116-117
 G&A (home office general & accounting expense),
 367
 GMP budgets, 338
 Hudson formula for extended overhead), 368
 home office costs (*See* overhead)
 impact costs (*See also* productivity/inefficiency), 63,
 139, 149-150, 337, 371-373, 383-425
 inadequate markup on change orders, 62
 inefficiency due to impact (*See*
 productivity/inefficiency; impact)
 insurance and bonding costs, 139-376
 integrate with entitlement and causation analysis,
 335-336, 341
 interest expenses, 69, 376-377
 labor costs, 102, 336-337, 357-359, 368-369
 least cost expediting, 255
 legal cost and expert fees, 377-378
 lost profits/work opportunities, 370-371
 magnification of cost by productive work hours, 337
 manual-based costing, 340
 market-based costing, 340
 markup, 62, 102, 137-143, 150-151, 374-376
 material costs, 102, 336-337, 359-360, 369
 measured mile productivity claims, 401-403
 modified total cost claim, 63-64, 186-187, 354, 400
 overhead, 139, 140-143, 150-151, 152-153, 344-346,
 365-368, 373, 374-375
 percent complete curves, 256-259, **257**, 326-328
 productivity rate/crew size estimate, 334-335,
 363-364
 profit calculations, 139, 370-371, 375-376
 progress payments, 68-69, 109, 337, 402
 project management cost, time, scope relationships,
 254-255, **254**
 quantity takeoff errors, 339
 quotes by subcontractors and vendors, 341
 recommended procedures, 346-355, **347**
 retainage, 68-69, 376
 small tools cost, 363
 subcontract costs, 102, 141, 362, 369
 summary costs, 102, 378-381, **279**, **380**
 time and materials, 42, 354
 timecards, 86-88, **87**
 total cost/modified total cost claim, 63-64, 354, 400
 unit cost estimates, 339-340, 353-354, 363-364, **364**
 unit price change orders, 353-354
 unit price estimates, 339-340, **364**
 variances in costs (*See also* quantity variances) 342
 warranty costs, 369
- cost analysis (*See also* damages) (*Cont.*):
 weekly labor reports, 343
 cost estimating (*See* cost analysis; estimating)
 cost exhibits, **326**, **327**, **329**, **363**, **364**, **379**, **380**, 449-
 450
 cost plus claims, 63, 64, 400-401
 cost plus contracts, 42
 cost reports (*See* cost accounting)
 cost summary, 378-381, **379**, **380**
 cost-loaded schedules, 256-257, **256**, **257**, 260, 448
 cost-time tradeoffs, 255-256, **256**
 counterclaims, 76, 239-240, 250-252, 378, 478
 CPM (critical path method) (*See also* scheduling)
 263-288
 activities, 264, 269
 arrow diagrams, 271-273, **272**, **275**, 285-288, **288**
 backward pass, 269, 277-278, **277**
 bar chart scheduling, 264-268, **265**, **266**, **267**, **268**,
 291-292, **292**, 297-298, **297**, 326, **237**
 computing the critical path, 269, 275-278
 constrained dates, 278-283
 crew chase to track resources, 283
 critical path, 270, 276-278
 earliest possible start (EPS) date, **280**, 281-282
 early finish, 269, 275-278, **276**, **277**
 early start, 269, 275-278, **276**, **277**
 finish-to-finish relationships, **279**, 280
 finish-to-start relationship, 278-280, **279**
 float, 267, 269, 275-278, 291-292, 305-306
 forecasting resources, 260, 283-284, 294, 304, 306
 forward pass, 269, 276-277, **277**
 fragnets, 269, 287, **288**, 307, 324, **325**, 448
 free float, 269
 Gantt chart scheduling (*See* bar chart scheduling)
 hammers (summary activities), 269
 histograms, 283-284, 328-331, **330**, **331**, 448-449
 i-j scheduling, 270-272, **272**
 lag/lead, 278-280, **279**
 late finish, 269, 275-278, **276**, **277**
 late start 269, 275-278, **276**, **277**
 latest allowable finish (LAF) date, **281**, 282-283
 leveling resources (*See* resource loaded scheduling)
 mandatory start/finish (MS/MF) dates, **282**, 283
 milestones, 269, 290-291
 network diagrams, 269, **272**, 274-275, 285-286
 PERT scheduling, 270, **271**
 precedence scheduling, 270-273, **272**
 prior activities (predecessors), 269
 projects, definition of, 269
 recommended procedures, 273-278, **273**
 relationships, 274-280, **276**, **279**
 resource loaded scheduling, 260, 283-284, 292, 304,
 306, 307, 324, **325**, 448
 revisions to schedule, 270, 311
 scheduled finish dates, 284, **284**

- CPM (critical path method) (*See also* scheduling) (*Cont.*):
- scheduled start dates, 284, **284**
 - start-to-start relationships, **279**, 280
 - subnets (subnetworks), 269
 - successor activities, 269
 - timescale arrow diagrams (TAD), 285-288, **285**, **287**, **288**, 326
 - timescale logic diagrams, 274-275, **274**, 293-294
 - updating, 267, 270, 287, 311
- credibility, 337-338
- credit for deductive change orders, 62, 151
- crew overmanning inefficiency, 408-409
- crew size, 88-90, **89**, 236, 335, 352, 391, 394-396, 408-409, **409**
- crew-balance charts, productivity/inefficiency, 419-421, **420**
- crowding/trade stacking inefficiency, 406-408
- cumulative curves, 326-328, **327**, 328, 329, 448
- customer satisfaction, 127
- daily reports, 88-92, **89**
- damages (*See also* cost analysis), 31, 48, 240-241, 333-381, 383-426, 442
- after-the-fact pricing, 346, **347**, 351-353
 - calculating damages, 334-335, 346-356, **347**
 - consequential damages, 251
 - defective work counterclaim, 252
 - elements of damages, 354-356
 - equitable adjustment, 346, **347**
 - force account pricing, **347**, 349-351
 - forward pricing, **346**, **347**
 - impact cost (*See also*) 63, 139, 149-150, 337, 371-373, 383-425
 - unit price change orders
- data sources (*See* source documents)
- data transfer, scheduling, (*See* import/export)
- deductive changes, 62, 151
- defective plans/specifications (*See* design errors)
- defective work counterclaim, 252
- delays (*See also* scheduling; cost analysis), 54-56, 71-76, 90, 141, 149-150, 261-262, 289, 300, 306, 355, 363-371, 387
- access limitation, 75, 118, 390
 - extended overhead cost, 365-368
 - adjusted as-built delay analysis, 301
 - compensable delays, 73-76, 300, 364-371
 - concurrent delay, 56, 73, 248-249, 304
 - coordination problems, 75, 119-120
 - design errors, 74, 388
 - detailed as-built schedule 56, 90, 180, 231-235, **233**, 247, 249-250, 294-296, 312-320, **314**, **316**,
 - differing site conditions, 59-60, 74, 120, 370, 372
 - disruption of work, 74, 262, 389
- damages (*See also* scheduling; cost analysis) (*Cont.*):
- excusable delays, 72-73, 299-300
 - global impact or total delay analysis, 300-301
 - interference, 74, 389
 - late response/late owner materials, 74
 - net impact delay analysis, 301
 - no damages for delay clause, 66-67
 - noncompensable delays, 71-73
 - nonexcusable delays, 71-72
 - one-sided but-for delay analysis, 301
 - percent complete curves, 256-259, **257**, 326-328, **327**
 - photographs/videotapes as evidence of progress, 92-93, 450-451
 - proof of delay claims, 56
 - quantifying delay costs, 365-371
 - resource constrained schedules, 302
 - responsibility for delay, 71-76
 - time impact analysis, 148-149, 301-302, **303**
 - time-in-kind time extensions, 302-303
 - weather delays, 72-73, 303-304, 386-387
- demonstrative evidence (*See also* exhibit preparation), 443, 444, 449
- depositions and interrogatories, 206
- design errors, 57-58, 74, 115-118, 388
- design/build contracts, 13, 33, 58
- designer (*See* architect/engineer)
- designer's records, 199
- detailed as-built schedule 56, 90, 180, 231-235, **233**, 247, 249-250, 294-296, 312-320, **314**, **316**,
- diaries, daily diary of work, 92, 198
- differing site conditions (*See also* impact cost), 59-60, 70, 74, 119-120, 370, 371-373
- digital data (*See* computer records)
- digitizing documents, 202-203, 210
- direct costs, 355, 356-364, **363-364**
- direct support costs, 141-142, 152-153
- disclaimers (*See* exculpatory clauses)
- disclosure, in contracts, 49
- discovery, 50-51, 163, 165
- documents, 204-206
 - Freedom of Information Act requests, 206
 - narrative text, risk of discovery, 225-226
- dispute management program (DMP), 15, **16**
- dispute review board (DRB), 77, 121-122, 185-186
- disputes, 3, 4, 5, 64-65, 130
- disruption (*See also* interference), 58, 74, 262, 385, 389-390
- documentation/recordkeeping (*See also* narrative text; fact finding & entitlement analysis), 79-82, 84-111, 136, 191-214, **192**, 217, 243-246
- agendas, rosters, minutes of meetings, 94-95, 196
 - as-built drawings, 68, 109
 - bidding records, 109, 194
 - change order requests (CORs) 140-141, 129-155

- documentation/recordkeeping (*See also* narrative text; fact finding & entitlement analysis) (*Cont.*):
- claims preparation, 164
 - communication skills, 125
 - computer records, 199, 202-204, 210
 - confusing terminology, 245
 - contract documents (*See also* contracts), 109, 195
 - copying documents, 199-201
 - correspondence and transmittals, 95-96, 196, 244
 - cost accounting records, 197, 204
 - crew size, 88-90, **89**, 236, 335, 352, 391, 394-396, 408-409, **409**
 - cross-checking for validity, 244
 - daily reports, field supervisor, 88-92
 - delivery records, 243-244
 - designer's records, 199
 - determining pertinent records, 199-200
 - diaries, daily diary of work, 92, 198
 - digitizing documents, 202-203, 210
 - discovery of documents, 50-51, 204-206
 - documents to request for claim review, 193-199
 - drawings and submittals, 109, 452
 - e-mail, 96, 203
 - estimate documents, 109, 194
 - excessive information, 246
 - exhibits, 206, 444-452
 - extra work files, 100-103, **101**, 108
 - facsimiles, 96
 - field records, 198, 244
 - forms, 86, **89**, **96**, **99**, **101**, **107**
 - handwritten documents, 202
 - identifying documents for claims, 209
 - lack of identification on documents, 245
 - logs of data (RFIs, CORs, etc.), 103-108, **104**, **107**
 - material supply records, 198-199
 - meeting records, 94-95, 196
 - memos, 97
 - notes of conversations, 95
 - obtaining documents, 191-199, 204-206
 - organizing for review, 109-110, 206-210, 246
 - owner's records, 185, 199, 205-206
 - "personal" documents, 192
 - photographs, 92-94, 198, 450-451
 - poor documentation, 243-246
 - prebid documents, 109, 194
 - preliminary claims analysis, 170, **171**, 176, 177, 178-180
 - problems, how to handle, 243-246
 - progress payment requests, 109, 195-196
 - progress reports, 196-197
 - purchase orders, 198-199
 - quality of bid documents, 13-14
 - recommended procedures, 191-204, **192**
 - references to source documents, 181
- documentation/recordkeeping (*See also* narrative text; fact finding & entitlement analysis) (*Cont.*):
- request for information (RFI), 97-98, **99**, 106-107, 125
 - scanning documents, 202-203, 210
 - schedules, 92, 196-197
 - shop drawings, 39, 109, 196
 - site plans, 451
 - source documents, citing references, 221, 317, 442-445
 - speed memos, 97
 - status reports to management, 110-111, **110**
 - subcontractor records, 110, 198
 - submittal logs, 104-105, **104**
 - submittal review and approval, 39-40, 53-54
 - test reports (QA/QC), 109, 194, 198, 243-244
 - timecards, 86-88, **87**
 - tracking document requests, 193
 - transcripts of depositions, 206
 - transmittals, 95-96
 - undated material, 221-222
 - union agreements, 198
 - videotapes, 93-94, 198, 451
 - weather data, 88, 109, 198
- drawings, 35, 109, 452
- errors (defective plans/specifications), 58
 - preconstruction review of plans, 84, 111-122
 - revisions, 35
 - shop drawings, 39-40, 109, 196
- duty to disclose, 49
- duty to proceed during conflict, 65
- e-Builder, 86
- e-mail, 96, 203
- earliest possible start (EPS) date, CPM, **280**, 281-282
- early completion schedule, 55-56, 306
- early finish, CPM, 269, 275-278, **276**, **277**
- early start, CPM, 269, 275-278, **276**, **277**
- earned value concept, 256-259, **257**, 326-328
- economic waste theory of recovery, 47
- efficiency (*See* productivity/inefficiency)
- Eichleay formula for extended overhead cost, 366-368
- electronic (digital) data (*See* computer records)
- ELIPSE schedules for impact analysis, 320-324, **322**, **323**
- enforcement of contracts and claim awards, 31-32
- engineer/designer (*See* architect/engineer)
- Engineers Joint Contract Documents Committee (EJCDC), 34
- entitlement (*See also* fact finding & entitlement analysis), 30, 71-76, 132, 140, 215-242, 235-238
- environmental clauses, 70
- equipment costs, 102, 336-337, 361-362, 369
- equipment reports, 343
- equitable adjustment (*See also* change orders and change order requests (CORs)), 30, 31, 346, 461-462, 485-486

- errors and omissions (*See* design errors)
- escalation costs/factors, 368-369
- estimating (*See also* cost analysis), 81, 108, 142-151, **144, 147**, 158, 194, 338-341
- evidence (*See also* documentation/recordkeeping; exhibit preparation), 51, 91
- exculpatory disclaimers, 59
- excusable delays, 72-73, 299-300
- exhibit preparation (*See also* claims preparation), 24, 206, **428**, 428-431, 444-453
 - cost data, 363-364, **379, 380**, 449-450
 - drawings, 452
 - handouts at presentation meeting, 478
 - histograms, 448-449
 - identifying exhibits, 445
 - phasing plans, 451
 - photographs 450-451
 - recommended procedures, **428**, 444-452
 - schedules, 445-448
 - site plans, 451
 - tabular schedule reports, 449
 - time-lapse photography, 451
 - videos, 451
- expendables (consumables) cost, 363
- experts, 51, 83, 122, 153, 157-165, **162**, 173, 185-186, 204, 213, 404
- express contracts, 37-38
- extended (unabsorbed) overhead costs, 365-368
- extended warranty costs, 369
- extensions of time, 63, 66, 260-261
- extra work logs, 108
- extra work orders (daily force account/time & materials) records, 100-103, 108, 135-136, 349-151
- facsimiles, 96
- fact finding & entitlement analysis, 215-252, 441-442
 - budgeting for fact finding, 227-228
 - causation, 235-238
 - chronological summary notes, 220-221, 231-235
 - claims analysis steps, 226-242, **226**
 - common problems, 243-248
 - contract review, 228, 230
 - cost analysis (*See also*), 335
 - counterclaims by owner, 239-240, 250-252
 - damages (*See also*), 240-241, 335
 - detailed as-built schedule, 56, 90, 180, 231-235, **233**, 247, 249-250, 294-296, 312-320, **314, 316**,
 - documentation (*See also*), 217-226, 243-246
 - establishing entitlement, 235-238
 - estimating damages and recovery, 240-241, 335
 - interviewing project participants, 210-213, 230
 - issues to be addressed, 172, 174, 177, 180-184, 216-217, 219-220, 245, 228-230, 289-291
- fact finding & entitlement analysis (*Cont.*):
 - kickoff meeting, 227
 - narrative text to organize and present facts, 173-176, 178-182, 217-226, 235-237, 438-439
 - owner defenses, 239-240, 248-250
 - planning/budgeting the analysis, 227-228, **229**
 - preliminary analysis, 167-190
 - recommended procedures, 226-242, **226**
 - release of claims, 247-248
 - schedule analysis, 239, 289-302, **290**
 - strategy and objectives, 215-217, 227
 - subcontractor/contractor disputes, 76, 246-247
 - summarize findings and conclusions, 241-242
 - summary review notes, 221-222
 - theories of recovery, 216-217, 230, 237
 - understanding the issues (*See* issue analysis)
 - verifying your findings, 242
 - visit the site, 213-214, 230
 - work plan, 227-228, **229**
- Federal Acquisition Regulations (FARs), 36, 473
- federal contracts (*See* public works contracts)
- field records, 198
- financing costs, 370
- finish-to-finish dates, CPM, **279**, 280
- finish-to-start dates, CPM, 278-280, **279**
- firm fixed price contracts, 41
- flexibility in negotiations, 476
- float, 54-56, 267, 269, 275-278, 291-292, 305-306
- flow down provisions to subcontractors, 37
- flow-process diagrams, productivity/inefficiency, 419-421, **420**
- force account, 100-103, **101**, 108, 135-136, 349-351
- force majeure*, 72
- forecasting resources, CPM, 260, 283-284, 294, 304, 306
- foreign laws/attitudes to disputes/claims, 14-15
- forward pass, CPM, 269, 276-277, **277**
- forward pricing, 346-349, **346**
- fragnets, 269, **287**, 288, 307, 324, **325**, 448
- fraud, 48
- free float, CPM, 269
- Freedom of Information Act (FOIA) requests, 206
- G&A (home office general & accounting costs), 367
- Gantt chart scheduling (*See* bar chart scheduling)
- global impact or total delay analysis, 300-301
- good faith negotiations, 44, 461-462
- guaranteed maximum price (GMP), 42
- hammocks (summary activities), CPM, 269
- handwritten documents, identifying author, 202
- hearsay, 51
- hindrance (*See* interference)
- histograms, 283-284, 328-331, **330, 331**, 448-449
- hold harmless clauses, 68

- home office costs (*See also* overhead), 336-368, 375
 how to get paid for claims, **155**
 human behavior, personalities in negotiating, 462-471
 human element in claims preparation, 159, 431-433
- i-j scheduling, 270-272, **272**
 impact (*See also* productivity/inefficiency), 63, 139,
 149-150, 337, 371-373, 383-425
 implied contracts, 38
 import/export, scheduling data, 203-204
 impossibility of performance, 47, 49, 73
 indemnity clauses, 68
 industry practice for interpreting contracts, 46
 inefficiency (*See* productivity/inefficiency)
 injunctions, 48
 inspections, 60, 67-68, 74, 389
 insurance/bonding costs, 376
 intent clauses and design errors, 57-58
 interest expenses, 69, 376-377
 interference, 46, 57, 60, 67, 73, 74, 76, 262, 322, 389,
 405, 407, 419, 424
 Internet resources, 9, 14, 86, 256
 interrogatories during discovery, 206
 interviewing project participants, 170-173, 210-212,
 228-230, 245, 403-404
 issue analysis, 172, 174, 177, 180-184, 216-217,
 219-220, 228-230
- jobsite overhead (*See also* overhead), 365-366, 374-375
- kickoff meeting, 164, 170-173, 227
- labor costs (*See also* productivity/inefficiency), 102,
 336-337, 357-359, 368-369
 cost reports, 336, 343, 401
 direct costs, 357-359
 magnification of cost by productive work hours, 337
 overtime, 405-406, **406**
- lag/lead, CPM, 278-280, **279**
 late finish, CPM, 2679, 275-278, **276, 277**
 late start, CPM, 2679, 275-278, **276, 277**
 latent ambiguity, 45
 latest allowable finish (LAF) date, CPM, **281**, 282-283
 learning curve productivity adjustment, 401, 425-425,
422, 423
 least cost expediting, 255
 legal costs, 377-378
 leveling, resources, CPM, 260, 283-284, 304, 306
 liability/risks/responsibility, 12-14, 46, 71-76, 111-114,
 169
 liens, 32, 37, 38, 50, 248
 liquidated damages, 48, 70, 250-251
 litigation, 5, 6, 12, 14, 64-65, 77
 attorney work product, 50-51
- litigation (*Cont.*):
 attorney-client privilege, 50-51
 evidence, 51
 requirements for recovery, 27, **28**
 witnesses, 51
 Little Miller Act bond claim, 28, 32, 50
 logs of data (RFIs, CORs, etc.), 103-108, **104, 107**
 loss prevention plan, 53, 67, 112-113
 lump sum contracts, 41
- mandatory start/finish (MS/MF) dates, CPM, **282**, 283
 manual-based costing, 340
 market-based costing, 340
 markup, 62, 102, 137-140, 150-151, 355, 374-375
 materials
 costs, 102, 336-337, 359-360, 369
 defective/nonconforming goods, 39
 quantity variations, 69-70
 shipping and delivery, 39
 measured mile productivity claims, 401-403
 mechanic's lien, (*See* liens)
 mediation, 5, 14, **16, 29**, 77, 501
 meeting records, 94-95, **95**, 196
 memos, 97
 milestones, CPM, 269, 290-291
 Miller Act (Little Miller Act) bond claim, 28, 32, 50
 Modification Impact Evaluation Guide, U.S. Army Corps
 of Engineers manual, 404-411, **407, 408, 409, 411**
 modified total cost claims, 63-64, 186-187, 354, 400
 monthly summary reports, 110-111, 343
 multiple prime contract coordination clauses, 57
 multiple-changes inefficiency (Leonard) 411-413, **413**
 municipal contracts (*See* public works contracts)
 Myers-Briggs type indicator, 463
- narrative text (*See also* claims preparation;
 documentation/recordkeeping), 217-226, 235-237
 advantages, 217-218, 235-237
 chronological summary notes, 220-221
 claim document prepared from, 438-439
 discoverable nature of narrative text, 225-226
 fact finding & entitlement analysis, 173-176, 178-182
 note taking at meetings, etc., 227
 organization and structure of narrative text, 218-220
 preliminary claims analysis, 173-176, **176**, 178-182
 style tips on preparing narrative text, 222-224
 undated material, 221-222
- National Electrical Contractors Association (NECA), 414
 negotiated contracts, 3
 negotiation (*See also* partnering), 6, 14, 16, 22, 24, 31,
 184-185, 455-501, **456**
 agenda and script, 478
 argument vs. negotiation/persuasion, 491
 attitude, 16-17, 479

- negotiation (*See also* partnering) (*Cont.*):
 authority to settle, 484-485
 body language, 468-470, **469**
 change orders/CORs, who negotiates, 164-165, 477
 closing the deal, 494-495, 499-500
 communication skills, 466-471
 conflict resolution, 471-472
 delays or failure in negotiating, 500-501
 equitable adjustment, 461-462, 485-486
 flexibility, 476
 follow up to initial meeting, 483-484
 good faith negotiations, 461-462
 human behavior/personalities, 462-466
 improving negotiating skills, 462
 initial presentations, **456**, 479-483
 issues to be addressed, 473
 managing the negotiations, 485
 mediation if negotiations unsuccessful, 501
 mutually acceptable solutions, 461-462
 objectives and goals, 473-474
 participants, 477-478
 partnering approach, 456
 preliminary analysis, 183-185
 preparation, rebuttals/counterclaims, 473-479, 482
 power, effective use of, 472
 reasonableness, 461
 recommended procedures, 456-462, **456**
 rehearsing negotiation, 479
 relative-strengths assessment, 457-459
 strategic planning, 455-462, 474-476, 484
 style of negotiation, 456-457, 478, 484
 tactics of negotiation, 478, 484, 486-498
 timely presentation of claim, 24-25, 153, 459-461
 timing, 493, 494
 win/win approach, 15, 456
 written agreements, 498-499
- net impact delay analysis, 301
- network diagrams, CPM, 269, **272**, 274-275, 285-288
- neutral experts (project neutrals), 77, 122, 185-186
- news clippings, 198
- no damages for delay clause, 66-67
- noncompensable delays, 71-73
- nonexcusable delays, 71-72
- notice of change, 60, 125
- offsets, in payments, 68-69
- omissions, in contracts (*See* design errors)
- one-sided but for delay analysis, 301
- onerous contract clauses, 53, 66-67, 68, 69, 79, 112-113
- oral contracts, 44, 45
- overhead, 139, 140, 142, **143**, 150-153, 344-346, 365-368, 373, 374-375
 Eichleay formula for extended overhead, 366-368
 G&A (home office general & accounting costs), 367
- overinspection, 60, 74
- overstaffing inefficiency, 408-410, **409**
- overtime, 405-407, **407**
- owner-controlled schedules, 259-260
- owner's liabilities/responsibilities/risks, 12-13, 19, 23-24, 46
- owner's records, 185, 199, 205-206
- owner's representative
 authority/written directives, 61, 64, 85, 87, 373, 389
 communications with, 94, 109-110, 113, 115, 136, 210, 356, 371, 427, 430, 483
 force account agreements, 102-103, 350
 inspection, good faith/overinspection, 47, 60, 389
 negotiations, 111, 113, 126, 129, 142, 151, 153, 248, 319, 346, 357, 381, 460, 479, 493
 notice of change, 61, 113, 124, 134, 135, 304, 352
 partnering approach, 115, 132, 150, 371, 431
 payment requests, 109, 353
 relationships, need to be positive, 19, 431, 460, 473, 477, 480, 490
 retaliation/resistance to claims, 12, 345, 353, 389, 460
 requests for information (RFIs), 98, 106-107, 114, 133, 389
 submittals, late return, 40, 388
 understanding their interests and needs, 22-23, 137, 430, 460
- partnering, 5-6, 15-20, 22, 28, 84, 121-122, 132, 456
- pass-through of subcontractor claims, 37
- patent vs. latent ambiguity, 45
- pay-if-paid clause, 69
- pay-when-paid clause, 69
- payment (progress payments)
 files, 109
 force account, 135-136
 late, 74, 328, **328**
 offsets, 69
 productivity data, use for, 337, 402
 progress payment clauses, 68-69
 prompt payment act, 69
 retainage, 68-69
 terms, 68-69
- percent complete curves, 256-259, **257**, 326-328, **327**
- performance specifications, 41, 58-59
- periodic charts (*See* histograms)
- permits, 53, 73, 118
- personalities in negotiating, 462-466, 474
- PERT scheduling, 270, **271**
- phasing plans, 451
- photographs, 92-93, 198, 450-451
- pie charts, 451
- plan-action-feedback loop, 25-26, **26**
- plans (*See* drawings)
- power, effective use of in negotiations, 472

- preaward phase constructibility review, 114-121
- prebid reviews, 111-114
- precedence scheduling, 270-273, **272**
- preconstruction conference, 16, 123, 371
- preconstruction reviews, 84, 111-122
- preliminary claims analysis, 167-183, **171**
- advantages of preliminary analysis, 168-170
 - attempt to settle claim, 183-185
 - budget for the analysis, 177, 183
 - contracts for, 168, 173
 - cost in time and money, 169-170
 - define issues to be covered, 176-177
 - documents, 170, 176, 177-180
 - estimate damages and recovery, 182
 - goals and objectives, 168-169, 176-177
 - initial briefings/interviews, 170-173
 - issue analysis, 172, 174, 177, 180-182
 - narrative text preparation, 173-176
 - presenting findings, 183
 - prioritizing issues, 172
 - recommended procedures, 170-183, **171**
 - reference facts to sources, 181
 - reviewing notes and documents, 176-178
 - risk assessment, 169, 182
 - site visit, 170, 178, 213-214
- prescriptive specifications, 40
- price, contract amount, 41-42
- prior activities (predecessors), CPM, 269
- privity of contract, 37-38, 46
- productivity/inefficiency (*See also* impact costs), 337, 383-425
- absenteeism, 388
 - acceleration inefficiency, 387-388, 405-411
 - action-response model, 394-395
 - basic elements of inefficiency, 385-386
 - Business Roundtable Report, 405
 - causation, 30, 237-238, 335-336, 386-396
 - computing productivity, 384, 385
 - cost plus method, 400-401
 - crew-balance charts, 419-421, **420**
 - crowding/trade stacking inefficiency, 406-408, **408**
 - ELIPSE schedule, 320-324, **322, 323**
 - expert opinion, 404
 - extreme temperature inefficiency, 413
 - factors determining productivity, 384-385
 - fatigue, 387-388, 405-406, **407**
 - flow-process diagrams, 419-421
 - improving productivity, 414-417
 - interference, 389
 - interviewing crew about inefficiency, 403-404, 418
 - labor costs, 86-88, 102, 336-337, 357-359, 368-369, 405-406, 408-410
 - learning curve adjustment, 401, 421-425, **422, 423**
 - loss of efficiency, cause/effect, 386-393
- productivity/inefficiency (*See also* impact costs) (*Cont.*):
- measured mile method, 401-403
 - Modification Impact Evaluation Guide, U.S. Army Corps of Engineers manual, 404-411, **407, 408, 409, 411**
 - modified total cost computation, 400
 - morale, 385, 387-394, 391-392
 - multiple changes inefficiency, 390, 411-412, **412**
 - multiple shift inefficiency, 388
 - out-of-sequence work inefficiency, 389
 - overstaffing inefficiency, 408-410, **409**
 - overtime, 405-407, **407**
 - rational analysis to select method, 396-400, **397**
 - recommended procedures, 396-400, **397**
 - ripple effect (impact), 371
 - safety, 392
 - start-stop operation inefficiency, 389
 - stopwatch studies, 418-419
 - subcycle efficiency, 416
 - surveying others on productivity, 404
 - task reassignment inefficiency, 410-411, **411**
 - temperature extremes inefficiency, 413, **413**
 - time-lapse photography, 419, 451
 - total cost computation, 400
 - work improvement methodology, 414-425
- profit margin (*See also* cost analysis; markup), 11-12, 139, 370-371, 375-376
- progress payment (*See* payment)
- progress reports, 196-197, **196**
- project management concepts, 15-16, 254-259
- cash flow forecasts, 254-259, **259, 327, 329**
 - cost, time, scope relationships, 254-255, **254**
 - cost-time tradeoffs, 255-256, **256**
 - critical path scheduling (*See* CPM)
 - earned value, 256-259, **257**
 - least cost expediting, 255
 - percent complete curves, 256-259, **257**
- project (standing) neutral, 77, 84, 121-122, 185-186
- prompt payment act clauses, 69
- proprietary specifications, 40
- protest, work under protest, 63, 135
- public works contracts, 34, 36, 84, 431
- punch list completion, 67-68, 126-127
- purchase orders, 32, 39, 198-199
- quantity variations, 41-42, 69-70, 353-354
- quantum meruit*, 30, 63
- quasi contracts, 38
- rainfall (*See also* weather), 88, 109, 303-304, 330, 327-328, **328**
- recommended procedures to resolve disputes, **5**
- recordkeeping (*See* documentation/recordkeeping)
- reference standards for specifications, 41, 58

- release of claim, 247-248
- reporting procedures, 80-82, 84-111
- requests for equitable adjustment (RFEA) (See also change order requests (CORs), 129
- requests for information (RFI) 97-99, 106-107, **107**, 125
- requirements to recover damages, **29**
- resolving disputes, **5**, 14, 15-16, 20, 22, 64-65, 126, 152-155, **155**, 471-472
 - Alternative Dispute Resolution (ADR), 14-15
 - arbitration, **5**, 14, **16**, 29, 64, 501
 - dispute review board (DRB), 121-122
 - mediation, **5**, 14, **16**, 29, 501
 - negotiation, **5**, 14, 15, **16**, **29**, 31, 133, 184-185, 455-501
 - neutral experts, 122
 - requirements for recovery, 28-32, 29
- resource constrained schedules, 260, 283-284, 294, 304, 306, 307, 324, **325**, 448
- responsibility (See liability/risks/responsibility)
- restitution, 48
- retainage, 68-69, 376
- risk management (See liability/risks/responsibility)
 - construction phase change management, 84, 123-127
 - preaward constructibility review, 84, 114-121
 - prebid loss prevention plan, 84, 111-114
- S curves (See cumulative curves)
- safety plans, 198
- scanning documents, 202-203, 210
- scheduled finish dates, CPM, 284, **284**
- scheduled start dates, CPM, 284, **284**, 96-197
- scheduling (See also CPM), 12, 54-56, 66, 92, 134, 253-332, 365, 372-373, 395, 398, 445-448
 - acceleration, 254-256, 289, 306
 - accuracy, 305
 - analyzing schedules for claims, 178, 180, 289-312, **290**, 442
 - arrow diagrams, 271-273, 272, 275, 285-288, **288**
 - art of scheduling, 263
 - as-built schedules, **290**, 294-296, 312-320, **314**, **316**, 446-447
 - as-planned schedules, **290**, 291-294, 445-446
 - banded comparison charts, 324-326, **325**
 - bar chart scheduling, 264-268, **265**, **266**, **267**, **268**, 291-292, **292**, 297-298, **297**, 326, **327**
 - better scheduling practices, 306-312
 - change order requests (CORs), 134, 137
 - chronological summary notes, 231-234
 - claims preparers' knowledge of CPM, 158
 - comparison schedule, 266, 297-298, **297**
 - compensable delays, 73-76, 300, 363-371
 - computerized scheduling, 262-263, **288**, 292, 311, 315, **316**, 448
 - concurrent delay, 56, 73, 248-249, 304
 - scheduling (See also CPM) (Cont.):
 - condensed as-built schedule, 317-318
 - constrained dates, 280-283
 - contractual requirements of schedule, 54-56, 259
 - coordinating with others, 56-57, 75, 119-120
 - cost-loaded schedules, 68, 260, 254-259
 - counterclaims, 250-251
 - crew chase, 283-284
 - critical path (See CPM)
 - cumulative curves, 326-328, **327**, 328, **329**, 448
 - daily reports, field supervisor, 88, 90, 92
 - data transfer between programs (See import/export)
 - definitions, 269-270
 - delays (See also), 66, 300
 - detailed as-built schedule 56, 90, 180, 231-235, **233**, 247, 249-250, 294-296, 312-320, **314**, **316**,
 - disputed schedules, 248-250, 261-262, 289-291
 - disruption, 262
 - early completion schedule, 55-56, 306
 - ELIPSE schedules, 320-324, **322**, **323**
 - errors in schedule, owner defense, 249-250, 261-262
 - excusable delays, 72-73, 299-300
 - exhibits, 445-448
 - fact finding & entitlement analysis, 221
 - float, 54-56, 267, 269, 275-278, 291-292, 305-306
 - fragnets, 269, **287**, 288, 307, 324, **325**, 448
 - Gantt chart (See bar chart scheduling)
 - global impact or total delay analysis, 300-301
 - histograms, **327**, 328-331, **330**, **331**, 448-449
 - i-j scheduling, 270-272, **272**
 - improving scheduling practices, 306-312
 - intermittent progress, 323
 - lag/lead, 278-280, **279**
 - legal rights/obligations of schedule, 54-56, 260-261
 - level of detail, 309
 - leveling, resources (See resource loaded schedules)
 - logs of data (RFIs, CORs, etc.), 103-108
 - milestones, 269, 290-291
 - modified as-planned schedule, 291-294
 - net impact delay analysis, 301
 - no damages for delay clause, 66-67
 - one-sided but-for delay analysis 301
 - owner defenses to schedule claims, 249-250
 - owner-controlled schedules, 259-260
 - percent complete curves, 256-259, **257**, 326-328, **327**
 - periodic charts (See histograms)
 - PERT charts/scheduling, 270, **271**
 - photographs/videotapes demonstrating progress, 92-94
 - practices, problems, solutions, 259-263, 273-278, 306-312
 - precedence scheduling, 270-273, **272**
 - project management concepts, 254-259
 - rainfall, cumulative curves, 326-328, **329**
 - recommended scheduling procedures, 273-278, **273**,

- scheduling (*See also* CPM) (*Cont.*):
- reports, 310, **322**
 - resource constrained schedules, 265, 304
 - resource loaded schedules, 260, 283-284, 304, 306, 307, 324, **325**, 448
 - reviewing schedule for fact finding, 230-231, 239
 - revising/updating schedules, 270, 311
 - S curves (*see* cumulative curves)
 - scheduling claims analysis procedures, 289-306, **290**
 - sharing schedules with others, 310-311
 - short interval schedules, 93, **93**, 266, 307-308
 - standard data exchange format (SDEF), 203
 - status line for updating, 268, **287**
 - subcontractor scheduling, 311-312
 - submittal logs, 104-106
 - summary schedules, 326, **326**
 - tabular schedule reports, 332, **332**, 449
 - time impact analysis, 148-149, 301-302, **303**
 - time-in-kind extensions, 302-303
 - timescale arrow diagrams (TAD), 275, **275**, 285-288, **285**, **287**, **288**, 293-294, 326
 - timescale logic diagrams, 274-275, **275**, 293
 - updating, 92, 267, 270, 287, 311
 - weather delays, 73, 299, 303-304, 330
 - what-if analysis, 298
 - would-have-been schedule, **290**, 296-300, 447-448
- settling claims (*See* resolving disputes)
- Severin doctrine, 38
- shop drawings (*See also* drawings) 39-40, 109, 196
- simplified claim preparation (*See also* claim preparation), 186-190
- site conditions (*See* differing site conditions)
- site plans, 451
- site visits, 170, 178, 213-214
- small claims court, 167
- small tools cost, 363
- soils report, 36, 70
- Spearin doctrine, 40
- specific performance, 48
- specifications (*See also* contracts), 34-35, 40-41, 58-59
- cash allowance specifications, 41
 - defective plans/specifications (*See* design errors)
 - design errors, 57-58, 74, 115-118, 388
 - organization in contracts, 34-35
 - performance specifications, 41, 58-59
 - preconstruction review, 84, 111-122
 - prescriptive specifications, 40
 - proprietary specifications, 40
 - reference standard specifications, 41, 58
- standby equipment costs, 361
- start-to-start relationships, CPM, **279**, 280
- state and federal laws superseding contracts, 36
- state contracts (*See* public works contracts)
- stepped cumulative curves, 328
- stopwatch studies, productivity/inefficiency, 418-419
- strict compliance, 47
- strikes, 73
- stop work order, 73
- subcontractors, 12, 19, 37-39, 75-76, 110, 121, 123-124, 133, 145, 198, 199, 310-312, 452-453
- AGC standard subcontract, 39
 - backcharge costs to subcontractor, **38**, 76
 - bonds, 32
 - change order requests (CORs) (*See also*), 133, 141
 - claims, 428, 452
 - communicating with, 123-124, 310-311
 - compensable delays, 75-76
 - contracts (*See also*), 37-39
 - cooperation and coordination, 56-57, 119-120
 - cost of subcontract work, 102, 341, 362, 369
 - crowding/trade stacking inefficiency, 406-408, **407**
 - daily reports, 91
 - disputes with general contractor, 38, 75-76, 246
 - documentation and records, 110, 198, 199
 - express contracts, 37-38
 - fact finding & entitlement analysis (*See also*), 246-247
 - flow down provisions, 37
 - general contractor claims against subcontractor, 38
 - implied contracts, 38
 - liens, 32, 37-38, 50, 248
 - partnering role, 19
 - pass through of subcontractor claims, 37, 452
 - privity of contract, 37-38
 - quasi contracts, 38
 - risk/responsibility of subcontractor, 19
 - Severin doctrine, 38
 - scheduling, 310-312
 - subcontractor claims against general contractor, 38, 75-76
- subcycle efficiency effect on productivity, 416
- submittal logs, 104-105, **104**
- submittal review and approval, 39-40, 53-54
- subnets (subsidiary networks), CPM, 269
- substantial completion, 47
- substantial performance, 46-47
- substitutions, 53-54, 74
- subsurface conditions, 70
- successor activities, CPM, 269
- summary costs, 102, 137-140, 378-381, **380**
- summary schedules (bar charts) 326
- superintendent's daily report (*See* daily report)
- superior knowledge, duty to disclose, 49
- suppliers (*See also* purchase orders; subcontractors), 16, 37-38, 39-40, 50, 71, 76, 124, 310, 348, 349, 359-360, 368-369, 452-453, 458-459, 477
- supply contracts (*See* purchase orders)
- suspension of work, 65-66, 74
- system unit cost estimates, 340

- tabular schedule reports, 332, **332**, 449
- task-reassignment inefficiency, 410-411
- taxes, cost of, 140
- techniques and tools, 7
- temperature extremes inefficiency, 412-413, **413**
- terminating contracts, 48-49, 65-66
- test reports (QA/QC), 109, 194, 198, 243-244
- theory of recovery, 30, 216-217, 237
- time and materials (cost plus), 42, 354
- time extensions, 63, 66, 260-261, 300, 302-303
- time impact analysis, 148-149, 301-302, **303**
- time of performance, 47, 66, 70
- time-in-kind extensions, 302-303
- time-lapse photography, 451, 419
- timely presentation of claims, 24-25, 153, 459-461
- timescale arrow diagrams (TAD) 285-288, **285**, **287**, **288**, 293-294, 326
- timescale logic diagram, CPM, 274-275, **274**
- total cost claims, 63-64, 354, 400
- total quality management (TQM), 6
- trade practice (usage of trade) concept, 46
- trading agreement (undocumented change), 64
- training programs, 15, 22, 83, 152, 160-161, 307
- transaction accounting reports, 343
- transcripts of depositions, 206
- transmittals (*See also* documentation/recordkeeping; submittals), 95-96
- trends affecting claims/disputes, 5-6, 11-15
- U. S. Army Corps of Engineers, claims manual, 404, 406-411, **406**, 408, **408**, **409**, **411**
- unabsorbed overhead (*See* extended overhead)
- undated material, review/referencing, 221-222
- unenforceable clauses, 114
- Uniform Commercial Code (CCC), 39, 46
- unilateral change orders, 50
- unit cost estimates, 339-340, **363**, **364**
- unit price estimates/contracts, 41, 339, 353-354, **364**
- value engineering reviews and change proposals (VECPs), 65, 114, 120-121
- variation in quantities (*See* quantity variations)
- vendors (*See* suppliers)
- venue of litigation, 65
- verbal directives, 61
- videotapes, 93-94, 198, 451
- visit site, 170, 178, 213-214
- warranties, 39, 369
- weather, 72-73, 198, 303-304, 327-328, 330, **328**, 386-387
- weekly labor reports, 343
- what-if analysis, CPM, 298
- win/win approach to negotiation, 15, 456
- witnesses (*See* experts; interviewing project participants)
- work improvement studies, 414-425
- working conditions, 92-94, 338, 340, 342, 353, 355, 361, 370-372, 384, 390, 393-395, 401, 402, 448, 451
- workshop for partnering, 296-300
- would-have-been schedule, 296-300, 447-448
- writing skills, 433-435

ABOUT THE AUTHOR

Steven S. Pinnell is an engineer and construction manager with over 25 years' experience in the management of engineering and construction projects. He is a principal of Pinnell/Busch, Inc., a firm based in Portland, Oregon, with a nationwide and international practice in project management services for the design and construction industry. Mr. Pinnell has lectured widely and authored numerous papers on project management, contract methods, contract negotiations, and construction dispute management.