

# CONSTRUCTION PROJECT MANAGEMENT: A Complete Introduction

Alison Dykstra, AIA, CSI

KIRSHNER PUBLISHING  
*San Francisco & Santa Rosa*



# INDEX

## A

### activities

- construction 1, 46, 114, 335
- critical 279, 282, 377
- predecessor 289, 291, 293-4, 299, 384
- sequence of 233, 288, 290
- successor 289, 291, 293, 296, 299, 387
- activity-on-node (AON) 278, 282, 291, 299, 373
- actual costs 137, 148, 164, 180-1, 183-8, 234, 258, 260, 333-4, 377
- addenda 109, 118, 191, 193, 315, 373
- additional impact costs 321, 323
- additive alternate 110, 118, 373
- administrative procedures 239, 247, 258, 298
- AGC (Associated General Contractors of America) 199, 225, 249, 304, 339, 374
- agencies, testing and inspection 316, 318
- agency construction management 81-2, 84, 86, 246, 373
- agent, owner's 86, 125, 207, 246, 373-4
- agents, commissioning 42, 262
- agreement 95, 101, 108-9, 169, 171-2, 175, 177, 179, 191-7, 199-201, 203-4, 208-9, 304, 327, 334, 350-3
- agreement forms 100, 118, 194, 198, 201, 312, 374
- AHJ (authorities having jurisdiction) 41-2, 51, 54, 79, 81, 97, 238-9, 242, 362-3, 365-6, 369, 374-5, 383
- AIA *see* American Institute of Architects
- AIA General Conditions *see* General Conditions
- alternates
  - additive 110, 118, 373
  - deductive 110, 118, 377

- American Institute of Architects (AIA) 130, 192, 196, 199, 204-6, 212-3, 233, 249, 304-5, 321-2, 325-6, 339-41, 343, 365, 373, 390
- application for payment 207-8, 213, 236, 331-2, 335-41, 343-34, 367-8, 373, 383, 385
- arbitration 350-3, 358-9, 373
- architect, definition (designer) 373
- as-built drawings 367, 370, 373
- Associated General Contractors of America (AGC) 196, 249, 374
- ASTM International (formerly American Society for Testing and Materials) 18, 42, 218
- at-risk construction management 81-3, 86-7, 374, 376
- authorities having jurisdiction *see* AHJ
- award of contract 80, 269, 282, 382

## B

- back-charge 248, 264, 266, 374
- Bank of America Tower (NY) 20
- bar charts 275-8, 280, 282-3, 285, 374, 380, 387
- bar charts, network 275, 279-82, 285, 382
- baseline schedule 296, 299
- benefits *see* labor burden
- bid
  - amount 106, 115, 124, 129-30, 164, 182, 184, 186, 333, 342
  - base 110, 118, 373, 377
  - bonds (bid) 112, 115, 129-30, 134, 235, 374
  - competitive 50, 68, 74-6, 82-3, 105-6, 115-8, 129, 133, 182, 186, 376, 386
  - definition 374

- documents (bid package) 49-50, 75, 99-100, 105-15, 118, 125, 127-8, 191-2, 201, 203, 213, 312, 334, 374, 381, 386
  - estimate 148, 160-1, 164-5, 167-8, 181, 232, 234-5, 285, 374
  - contractor's 119, 135, 260
  - fixed 187
  - invitation to 111, 118
  - notice to 118
  - price 113, 129-30, 134, 138, 181, 186, 260, 307, 383
  - process 50, 107, 109-10, 115, 118, 122, 182, 235, 285, 373, 384
  - responsive 115, 118, 386
  - schedule 269, 282, 285, 374
  - shopping 305, 312, 374
  - subcontractor's 115, 305, 307, 312, 374
  - submittal 49, 106, 113-5, 118-9, 127, 135, 374, 386
  - bidder's questionnaire 107-8, 118, 374
  - BIM (Building Information Management) 6,**  
28, 84-6, 98, 375
  - binding agreement 171-2, 176, 377
  - bonds 35, 106, 108, 110, 127-34, 187, 205, 209, 247, 309, 341, 375, 381, 388
    - bid *see* bid bonds
    - construction 108, 127-8, 134, 374, 383, 387-8
    - contractors license *see* contractor license bonds
    - municipal 127
    - payment and material 129-31, 134, 251, 341, 383
    - performance 129-31, 134, 235, 240, 383
    - surety 127, 375
  - brand name 218, 226, 378, 385
  - breach of contract *see* contract
  - budget
    - contractor 166, 234, 260
    - owner 24, 37
  - building, sustainable 14, 16-7, 19, 24
  - building codes 6, 19-22, 28-9, 35, 62, 67, 69, 84, 207, 239, 260-2, 365-6, 375, 387
  - building department 80-1, 363, 365
  - Building Information Modeling *see* BIM
  - building permit 2, 53, 80-1, 174, 195, 238-9, 247, 365
  - business competency 305, 313
  - buying out the job 229, 232, 234, 242-3, 303, 305, 307, 309, 311-3, 375
- C**
- CAD (computer aided design) 98
  - CALGREEN 22**
  - capability 131-2, 134, 172-3, 176, 196, 218, 221, 278, 293, 375
  - capacity
    - contract 134, 172-3, 176, 375
    - contractor 131, 134, 173, 176, 375
  - capital 131-2, 134, 206, 375
  - Carson, Rachel 17-8
  - cash flow projections 62, 233
  - certificate of occupancy 239, 362-3, 365-6, 369-70, 375
  - certificate of substantial completion 53, 240, 363-5, 371
  - change directives 208, 325-6, 328, 375
  - change order 133, 193, 208, 249, 304, 307, 315-7, 319-25, 327-9, 338, 340, 343, 349, 375, 382
    - proposal 255, 319-21, 323, 328-9, 347, 349, 375, 385
    - request 321, 328, 375
  - changes to the work 325, 376, 391
  - character, contractor's 131-2
  - CHEERS (California Home Energy Efficient Rating Service) 25**
  - Chicago, IL 22, 28
  - city location factor 159, 167, 375
  - claims 205, 209, 229, 347, 349, 351, 353, 355, 357, 359
  - close-out 45-6, 52, 54, 229, 361, 363, 365, 367, 369, 371, 375
  - closed projects 376
  - commercial sector 10, 376
  - commissioning 29, 42, 262, 266, 370, 376
  - competitive bidding *see* bids, competitive
  - completion date 79, 201, 210, 297, 317, 323, 373
  - completion of contract requirements 367
  - computer aided design (CAD) 98; *see also* software
  - computer-based schedules 279, 281
  - conceptual estimates 62, 153-6, 167, 376
  - conflicts 87, 182, 193, 225, 317, 348-50, 356-7, 359, 383
  - consideration 172, 174, 176, 376
  - construction
    - bonds 108, 127-8, 134, 374, 383, 387-8
    - completion of 245, 369-70, 378
    - contracts 33-4, 49-50, 52, 54, 82-3, 100, 109, 118, 171, 179, 181, 206-7, 246, 315-6, 331-4, 374

- costs 7, 47, 49, 81, 85, 148, 150, 165, 180, 184, 187, 309, 318, 334, 385
- defective 38, 131
- documents 49, 74, 81, 92, 95, 97-8, 100-1, 138, 348, 376, 390
- drawings 100, 107, 109, 376
- fast-track 78-84, 86
- industry 1-5, 7-11, 13-4, 24, 121, 127, 131, 179, 187, 189, 213, 226, 243, 279, 309, 380
- measuring 150, 388
- methodologies 2, 16
- period 80, 235
- process 3, 6, 24, 74, 81, 83, 116, 270, 311, 337, 390
- sequential 78, 86, 379, 386
- site 17, 370, 378
- stage 245, 344, 386
- sustainable 8-10, 29, 380, 388
- team 43, 50, 53, 77, 171, 318, 385
- wastes 17, 22, 24
- work 2, 38, 82-3, 185
- construction management 4, 31, 39, 42, 73-4, 79, 81, 86, 376, 391
- construction management (CM) delivery method 74, 79, 86, 376
- construction manager 6, 34, 73, 79, 81-4, 210, 246, 318
- Construction Specifications Institute *see* CSI
- construction time, official start of 240, 242, 383
- continuation sheet 338-40, 344-5, 377
- contract
  - amount 130, 183
  - award of 106, 115
  - breach of 134, 172, 176-7, 209, 375, 377
  - capacity 134, 172-3, 176, 375
  - condition of 176, 381
  - consideration 172, 174, 176, 376
  - cost plus a fee 125, 165, 181, 185-8
  - fee 183-5, 189, 333
  - fixed price (lump sum) 3, 76, 165, 179-81, 183-4, 188, 196, 334, 379, 382, 387
  - guaranteed maximum price 181, 185, 187-9, 333-4, 377, 380
  - lawfulness 172, 174-6, 196, 381
  - manager 68, 86, 376
  - multiple prime 73, 76, 82, 84, 86, 382
  - mutual agreement 172-3, 176-7, 196, 198, 323, 358-9, 382-3
  - negotiated 116, 118, 382
  - reimbursable 165, 180, 188
  - requirements 39, 53, 73, 252, 262, 343, 356, 362, 364, 367
  - stipulated-sum 188, 379, 382, 387
  - sum 131, 183-4, 193, 201, 208, 272, 323, 326-8, 340, 343, 373, 382
  - time 24, 32, 37, 51-2, 78, 84, 149, 198, 208, 240, 243, 259, 261, 266, 363, 377
  - types 125, 179-80, 185, 188-9, 318, 333, 335
  - unit price 181, 185-6, 188-9, 334-7, 388
  - valid 173, 176, 196, 200-1, 323, 376
  - written 196, 200
- contract documents 42, 169, 191-3, 199-201, 203-7, 212, 235-6, 245-6, 252, 258, 261-2, 315-6, 343-4, 365, 373-7, 383-5
- contractor
  - general building 26, 29, 38
  - inexperienced 124, 356
  - pre-qualify 35, 74, 106, 110, 117, 119, 122, 135, 383
  - selected 118, 384
  - specialty (trade) 43, 216, 387
- contractor, license bonds 131, 134, 381
- contractor's
  - performance 36, 75, 262, 369
  - project estimate 138
  - responsibility 206, 261, 266, 385
  - team 33, 37, 40, 43, 53, 55, 115, 282-3, 286, 367-9, 371, 387
- contractual relationships 33, 40, 73, 76-7, 84, 245
- control logs 254-5, 266, 377
- correction period 53, 363-4, 377
- Cost Construction Data 161
- cost estimate 6, 24, 81, 95, 114, 123-4, 141, 147, 151, 167, 181-2, 197, 269, 374, 376, 378-9, 384
- cost plus fee contract 125, 165, 181, 185-8
- cost plus guaranteed maximum price (GMP)
  - contract 181, 185, 187-9, 333-4, 377, 380
- cost projections 36, 155
- costs
  - additional 84, 318
  - detailed breakdown of 344, 386
  - direct 141-3, 145-6, 150-1, 165, 320, 378
  - final 81, 182-4, 188, 377, 380
  - fixed 146, 181

- general conditions (general requirements) 145, 150, 380
  - indirect 140, 146, 184, 260
  - indirect business costs (overhead) 140, 146, 154, 184, 308, 342
  - indirect project costs 141, 145-6, 150-1, 161, 164-5, 185, 259, 323, 334, 338, 380
  - reimbursable 196, 334
  - subcontractor 161, 165, 320, 332, 336
  - unit 143, 150, 155, 388
- CPM (critical path method) 259, 279, 282, 377
- crashing the schedule 259, 266-7, 377
- credit 128, 342, 344, 381
- critical path method *see* CPM
- critical path scheduling 294
- CSI (Construction Specifications Institute) 162, 218-9, 221, 223, 226-7, 260, 287, 376, 379, 382, 390
- D**
- daily job reports 249
- Davis-Bacon Act 144-5, 150, 377
- DB *see* design-build
- DBB *see* design-bid-build
- deductive alternate 110, 118, 377
- delays 50-1, 68, 126, 140, 204, 231, 248, 251, 258-9, 264-5, 273-4, 294-5, 306-7, 316-7, 342-3, 348-9
- deliverable 32, 71, 86, 377
- delivery method (DM) 42, 71-9, 81-7, 117, 171, 180, 196, 246, 358, 373-4, 376-8, 385
  - agency construction management 81-2, 84, 86, 246, 373
  - at-risk construction management 81-3, 86-7, 374, 376
  - design-bid-build (traditional) 74, 76, 78, 81, 87, 117, 180
  - design-build 73-4, 77-80, 85-6, 246, 378
  - design-negotiate-build 73-4, 77-80, 85-6, 246, 378
  - integrated project delivery 74, 83-6, 356-8, 381
- demobilization 362, 366-7, 370, 378
- dependencies 278, 280, 282, 291, 299, 373, 378, 383-4
- design
  - completion of 73, 81, 86, 154, 160, 378
  - consultants 77, 82
  - details 155, 167, 387
  - development 92, 95-97, 100
  - documents 75, 116, 118, 182, 382
  - final 92, 95, 97, 138
  - information 123-4, 133-4, 138, 153-4, 161, 167, 180, 182, 184, 374, 376, 378-9, 388
  - schematic 92, 95-6, 100, 386
  - stage 49, 67, 76, 80, 92, 95, 98-101, 116, 149, 192, 378
  - team 80, 109, 261
- design-bid-build (DBB) 73-8, 81-3, 85-7, 100, 117, 180, 246, 378, 386, 388
- design-build (DB) 73-4, 77-80, 85-6, 246, 378
- design-negotiate-build *see* DNB
- designers 1-3, 5-6, 15-6, 19, 21, 33-5, 39-42, 48-9, 67-9, 72-4, 92, 95-6, 100, 204, 373, 378
  - project's 54, 100, 384
- detailed estimates 46, 138, 153-4, 160-1, 167, 378, 388
- details 94, 100, 378
- developer 29, 47, 54, 60-2, 68-9, 112, 378, 388
- direct costs *see* costs, direct
- discount 142, 149, 235, 378
- dispute resolution board *see* DRB
- disputes 84, 175, 200, 204-5, 209, 212, 229, 264-5, 315, 347-53, 355-9, 378-9, 381
- divisions 162, 219-23, 226-7, 379, 386
- DM *see* delivery method
- DNB (design-negotiate-build) 76, 86, 378
- documents 48-9, 99-101, 105-10, 112-5, 118-9, 171-2, 191-6, 210, 225, 242-3, 326-9, 337-9, 365, 370-1, 373-5, 383-4
  - written 64, 90, 92, 97, 109, 216
- drawings 6, 92-6, 98, 191, 193, 379
  - details 94-5, 378
  - elevations 84, 92-6, 379
  - floor plans 93-4, 96, 380
  - sections 94-6, 386
- DRB (dispute resolution board) 350, 352, 358, 378
- duration 39, 286-7, 290, 295-6, 299, 334, 341, 379
- E**
- EJCDC (Engineers Joint Contract Documents Committee) 199, 204

elevations 84, 92-7, 100-1, 193, 224, 238  
 encumbrance 343, 353, 358, 381-2  
 Energy Independence Program (Sonoma county, CA) 23  
 Energy Star 20-1  
 equipment costs 148, 162, 165, 181  
 estimate summary 164, 167, 321, 337, 379  
 estimates 4, 47, 100-1, 113-4, 123-4, 137-8, 140-3, 147-51, 153-4, 156, 160, 164-8, 187-8, 290, 378-9, 386-7  
   conceptual (ROM) 154-6, 167, 386  
   contractor's 114, 138, 335  
   detailed (final, bid, unit price) 46, 138, 153-4, 160-1, 167, 378, 388  
   preliminary 154, 161, 167, 384  
   rough-order-of-magnitude 154-6, 167, 386  
 estimator 36, 42, 60, 98, 114, 139, 141-3, 145, 147-8, 155-6, 158, 161-3, 165-6, 184, 232-3, 379  
 exclusion 195-6, 201, 379  
 expenses, anticipated subcontractor 118, 383  
 experiential information 123, 134, 379

## F

fabrication 223, 251-3, 255, 261, 266, 271, 386  
 facilitator 350-1, 359, 382  
 facility manager 41, 53, 262, 365, 367-9  
 fast-track 77, 81, 86-7, 183, 379  
 feasibility 54, 57, 59-63, 65, 67-9, 90, 99, 138, 154, 269, 379  
 fee 116, 126, 128, 150, 165, 181, 183-5, 187-8, 206, 238, 326, 333, 377, 379  
 field questions 39, 247, 249, 319-20, 323, 328, 379, 385  
 final design 92, 97  
 final project costs 167, 184, 189, 379  
 financial feasibility 61-3, 69, 155, 379  
 financial risk 62, 74, 83-4, 126, 134, 179-80, 183, 185, 187, 308, 374  
 finish to finish 293-4, 299, 379  
 finish to start 293-4, 299, 379  
 fixed price contract 3, 76, 165, 179-81, 183-4, 188, 196, 334, 379, 382, 387  
 float 295-6, 299, 380  
 floor plans 93-4, 96, 100-1, 238, 380  
 flow-through clause 312, 380

## G

Gantt charts 275-6, 282, 374, 380

GBCI (Green Building Certification Institute) 25, 28  
 general & supplementary conditions 203, 205, 207, 209, 211  
 general conditions 100, 118, 150, 191-3, 198, 201, 203-10, 212-3, 225, 233, 326, 332, 342-4, 363, 373-4, 380  
 general contractor (GC) 36-40, 42-3, 80-3, 86, 127-30, 145-6, 196, 207-8, 262-6, 301-11, 313, 318-20, 331-3, 335-8, 357-9, 378-81  
 globalization 5, 7-8, 11  
 GMP (guaranteed maximum price) 181, 185, 187-9, 333-4, 377, 380  
 going out to bid 105, 118, 122, 380  
 Gore, Al 25  
 Green Building Certification Institute (GBCI) 25, 28  
 Green Building Council 27, 29, 388  
 green construction 8-11, 13-29, 380-1, 388, 390-2  
 Green City Buildings Act (NY) 22  
 green jobs 26  
 green standards 21-2  
 GreenPoint 21, 25  
 greenwashing 15, 29, 380  
 guaranteed maximum price *see* GMP

## H

high performance 16, 29, 380  
 home office 146-7, 233  
 homeowner 31, 60-1, 63, 128

## I

ICC (International Code Council) 21-2, 28, 67  
 impact analysis 323, 380  
 in the field 15, 39, 42, 143, 233, 251, 294, 318-9, 332, 348, 380  
 indirect business costs 141, 146, 150, 380, 383  
 indirect project costs 141, 145-6, 150-1, 161, 164-5, 185, 259, 323, 334, 338, 380  
 industrial sector 10, 380  
 information contractors 100, 193, 226, 387  
 infrastructure 2-3, 10, 45, 380  
 inspections 37, 41-2, 209, 223, 247, 261-2, 266, 270, 285, 365, 385  
 installation requirements 6, 84, 98, 216-7  
 instructions to bidders 107, 112, 191

insurance 34, 128, 134, 187, 205, 209, 236-7,  
 240, 242-3, 247, 364-5, 381, 387,  
 391  
 integrated project delivery *see* IPD  
 interest 23, 25, 27, 62, 69, 113, 127, 133,  
 207, 335, 337, 342-3, 381  
 International Code Council (ICC) 21-2, 28,  
 67  
 invitation to bid 111-2, 118, 381, 387  
 invoices 208, 334-6  
 IPD (integrated project delivery) 74, 83-6,  
 356-8, 381  
  
**J**  
  
 job costs 125, 132, 141, 145-6, 150, 380, 383  
 jobsite layout plan 50-1, 232, 237, 241-3, 381,  
 387  
 jurisdiction 38, 41-2, 53-4, 67, 81, 238, 362-3,  
 365-6, 369-70, 374  
  
**L**  
  
 labor 5, 7, 9, 138-41, 143-5, 149-50, 154-5,  
 160-3, 165, 217, 254, 290, 320-1,  
 336, 354, 377-8  
 labor burden 164-5, 167, 320-1, 381  
 labor costs 98, 123, 139-40, 142-3, 145, 148,  
 151, 259-60  
 labor hours 32, 142, 163, 298  
 lawfulness 172, 174-6, 196, 381  
 Leadership in Energy and Environmental  
 Design *see* LEED  
 LEED (Leadership in Energy and  
 Environmental Design) 19-21, 25,  
 27-9, 42, 262, 381, 387-8  
     LEED-AP 25  
     LEED-GA 25  
 legal obligations 105, 107, 110, 174  
 letter agreements 196-8, 201, 381  
 license, contractor's 38, 131, 177  
 lien 130, 306, 336, 341, 343, 353-5, 358-9,  
 368, 381-2, 384  
 lien rights 353-5, 358-9, 381, 384  
 lien waiver 358, 381  
 lines of credit 342, 344, 381  
 linkages 281, 291, 293-4, 296, 299, 378, 381  
 liquidated damages 53, 123, 125-6, 134, 193,  
 195, 210, 212, 240, 265-6, 381  
 litigation 148, 347, 350-3, 358-9, 381  
 loans, short-term construction 35, 43, 384  
 local building departments 41-2, 51, 54, 238,  
 374

location factor 159-60, 168  
 logic, job 277, 286, 289-91, 293, 295, 299,  
 381  
 logic diagrams 282, 299, 381-2, 384  
 logs 251-2, 254, 311, 323, 363  
 long-lead item 311-2, 382  
 look-ahead schedule 259, 274, 282, 296-8,  
 382  
 lump-sum contract 125, 180-3, 186-9, 318,  
 332-6, 338, 345, 379, 382, 387

## M

management of subcontractors 247  
 managing costs 52, 260  
 manuals 254, 367, 370, 383  
 manufacturers 1-2, 6, 18, 41, 53, 98, 215,  
 218, 223, 226-7, 245, 252-4, 261-2,  
 266, 361, 364-5  
 markup 145, 320-1, 324  
 master construction schedule 232-3, 235,  
 242-3, 258, 270-1, 274-5, 282, 285-6,  
 296, 382  
 MasterFormat 162, 165, 218-23, 226-7, 260,  
 287, 337, 379, 382, 386  
 material  
     costs 140, 142, 145, 148-9, 151, 195,  
     248, 342  
     deliveries 241, 311  
 materials 5-7, 138-43, 148-50, 154-6, 160-3,  
 165, 215-7, 223-4, 233-4, 236-7,  
 250-5, 260-2, 264-7, 302, 311-2,  
 354-5  
     amount of 114, 118, 385  
     cost of 7, 150, 388  
     procurement of 232, 241, 311  
     quality of 109, 247  
     quantity of 142-3, 182, 298  
     review of 29, 42, 118, 376  
 maximum price, guaranteed 181, 185, 188-9,  
 334, 377, 380  
 mechanic's liens 130-1, 306, 343, 347, 349,  
 351, 353-5, 357-9, 368, 381-2  
 mediation 209, 350-3, 359, 382  
 meeting minutes 147, 239, 247-9, 255-8, 264  
 Microsoft Project 6, 276, 278, 280, 287, 293,  
 298, 391  
 milestones 47, 269, 275, 278, 282, 287,  
 296-7, 331, 382, 387  
 minimum project duration 282, 377  
 minor changes 327  
 miscommunication 348-9

mobilization 45-6, 50-1, 54-5, 80, 219, 229, 231-3, 235, 237, 239, 241-2, 245, 338, 382  
 modifications 130, 193, 208, 216, 246, 315, 328, 375, 382  
 multi-prime contract 82, 84, 86, 382  
 mutual agreement 172-3, 176-7, 196, 198, 323, 358-9, 382-3

## N

National Association of Home Builders (NAHB) 21, 25, 28  
 National Electrical Contractors Association (NECA) 26, 28  
 National Green Building Program 21, 25  
 negative impacts 8, 10, 14, 29, 380, 388  
 negotiated jobs 116-7  
 negotiation 76, 116-7, 234, 303, 347, 350, 352, 359, 382, 390  
 network bar charts 275, 280  
 network diagrams 275, 277-80, 282-3, 285-6, 291, 293, 295-6, 299, 373, 377, 382-4  
 node 278, 282, 291, 299, 373, 383  
 notice of award 116, 118, 383  
 notice of completion 354  
 notice to bid 118  
 notice to proceed 240, 242, 287, 296-7, 383

## O

obligations  
   contractor's 128, 206, 302  
   contractual 38, 105, 124, 342, 367  
 occupancy 13-4, 41, 45-6, 52, 68, 80, 138, 229, 239, 245, 361-3, 365-7, 369-71, 375  
 omissions 114, 148, 206, 315-6, 319, 348  
 open projects 133, 383  
 overhead 77, 114, 145-7, 149-50, 155, 161-2, 164-5, 181, 183-4, 188, 320-1, 323-4, 333-4, 337-8, 377, 379-80  
 overhead costs 140, 146, 154, 184, 308, 342  
 overtime 140, 144, 248, 259, 273  
 owner 32-43, 46-55, 59-65, 72-87, 105-19, 121-32, 179-89, 191-201, 203-13, 315-21, 323-9, 331-7, 341-5, 352-9, 361-71, 380-8  
   budget 24, 37  
   feasibility 57, 59, 61, 63, 65, 67, 69  
   move-in 52, 269, 282, 382

private 34-5, 43, 54, 76, 111, 116, 122, 378, 384  
 project estimate 138  
 public 43, 67, 76-7, 383  
 review 319-20  
 owner-contractor agreement 179, 199, 335

## P

partnering 357-9, 383  
 path, critical 259, 279-80, 282-3, 295-6, 317, 377  
 payment 37, 109, 173-4, 183, 196-7, 205, 207-9, 235-6, 246-7, 310, 331-40, 342-5, 355, 368, 383, 385-6  
   bonds 129-31, 134, 251, 341, 383  
   documents 337, 339-40, 344, 377  
   final 52-3, 208, 335, 355, 361-3, 365, 367-8, 370-1, 385  
   monthly 333-5, 344, 386  
   period 183, 195, 332-6, 339  
   process 194, 208, 239, 332, 334, 345  
   requests 34, 36, 247, 262, 264, 332-3, 335-40, 342-4, 358, 368, 373, 381, 383  
   terms 194, 337  
 performance bonds 129-31, 134, 235, 240, 383  
 permit 51, 195, 211, 232, 238, 242, 366, 383  
 PERT diagrams 277, 282, 299, 381-2, 384  
 phases 52, 60, 79, 96, 138, 151, 184, 361-2, 366  
 physical work 32-3, 37, 51-4, 81, 86, 231, 240, 242, 245-6, 270, 274, 301, 361-2, 367, 373, 375  
 planning 1, 32-3, 35-6, 42, 91, 113-4, 119, 135, 153, 231-2, 239, 270-3, 378  
 plans 13-14, 49-50, 68, 80, 84, 89, 92-5, 97-8, 100, 124, 130, 134, 193, 261, 348, 378-9  
 plug numbers 114, 118, 383  
 POs *see* purchase orders  
 pre-construction 24, 37, 45-6, 50, 52, 54, 80, 86, 229, 231-5, 237, 239, 241-2, 247, 251, 384  
   activities, important 50  
   meeting 232, 239, 242-3, 316, 357, 384  
   submittals 232, 235, 241, 384  
 pre-qualification 108, 118, 384  
 precedence diagram 282, 299, 382-4  
 predecessor 289, 292, 296  
 preliminary estimate 154, 161, 167, 384



- preliminary schedule information 108
  - price
    - contractor's 118, 374
    - set 81, 181, 188, 379, 382, 387
  - primary responsible party 47-52, 59, 89
  - Primavera (Oracle) 6, 293
  - prime contract 302, 304
    - award of 45-6, 49
  - prime contractors 40, 43, 55, 84, 86, 345, 353-5, 382, 384
  - prime contracts, multiple 73, 76, 82, 84, 86, 382
  - private owners 34-5, 43, 54, 76, 111, 116, 122, 378, 384
  - private projects 35, 41, 43, 180, 298
  - procurement
    - materials 311-2
    - subcontracts 384
  - product data 206, 217, 252-3, 266, 367, 384, 387
  - product manufacturers 53
  - productivity 139, 143, 150, 259-60, 273, 290, 323, 384
  - productivity rate 143, 162
  - profit 47, 77, 84, 114, 123, 126, 133, 141, 154-5, 161-2, 164-6, 183-4, 188, 320-1, 333-4, 337-8
  - programming 19, 21, 23, 25, 28-9, 45-6, 48-9, 54-5, 57, 80, 84, 89-93, 95, 97-101, 105, 384
  - progress payments 132, 260, 304, 331-4, 344, 384
  - project
    - activities 43, 282, 386
    - budget 62, 96, 156
    - closed 117, 376
    - commercial 2, 10, 22, 38, 376
    - completion 116, 126, 363
    - costs 7, 69, 74, 128, 133, 147, 154, 158-60, 166-7, 182, 186, 247, 261, 274, 311, 315
    - delays 280-1
    - delivery 42, 47-8, 57, 59, 68, 71-5, 77, 79, 81, 83, 85-7, 245, 358, 376, 381, 385
    - delivery, integrated 74, 83, 86, 356-8, 381
    - design 48, 83, 100, 376
      - fast-tracked 79
    - feasibility 45-7, 59-60, 69, 80, 90
    - fixed price 164
    - formulaic 182, 189
    - industrial 3, 10, 35, 42, 378, 380
    - negotiated 117, 180
    - participants 239, 242, 347, 384
    - public 3, 35, 77, 144, 180
    - residential 2, 38, 64, 156, 158, 168
    - schedule 78, 306
    - sequential 79-80
    - site 140, 232, 318, 352
    - size 62, 139, 154
    - stages 45, 47, 49, 51, 53, 55, 78, 80
    - sum 194, 198
    - tasks 276, 280
    - time 75, 80, 247, 273, 316
    - types 2, 82-3, 85, 200
    - work schedule 263
  - project management 266, 272, 294, 356, 377, 385, 388, 391
  - project manager 4, 6, 11, 36, 39, 43, 233, 264, 293, 367, 385
    - contractor's 146, 232, 250, 260, 332, 368
  - project manual 192, 216, 226, 385
  - public owner 35, 43, 385
  - punch list 362-4, 368, 370-1, 385
  - punchout 287, 296-7
  - purchase orders (POs) 39, 234, 242, 251, 260, 262, 302, 311-3, 336, 375, 384-5
- Q**
- quality 18, 72, 97, 123, 126, 138, 143, 148, 155-6, 180, 215-7, 261-2, 266, 307-8, 357, 385
    - of building materials 139
    - of design information 123-4
  - quality assurance 217, 223-4, 261, 266, 309-10, 385
  - quality control 42, 219, 261, 267
  - quantities 114, 142-3, 148, 161-2, 164, 185-6, 215-7, 248, 260, 270, 290, 311, 334, 336, 345, 385
    - actual 186, 188, 298, 332, 334, 388
  - quote 50-1, 118, 142-3, 154, 164, 186-7
- R**
- rating 19, 21, 130, 132-4, 385, 388 *see also*
    - surety program
  - rating system, voluntary 29, 381, 387
  - Reed Construction Data 148, 150, 385
  - regulatory requirements 21, 35, 40, 53-4, 61-3, 92, 242, 375, 378, 383
  - requirements

- bonding 107-8, 127-8, 235
    - general 145, 219, 221
    - submittal 223, 252, 311
  - residential sector 10, 386
  - responsible bidder 115, 118, 386
  - responsive bid 118, 386
  - retainage *see* retention
  - retention 335, 340-2, 344, 368, 371, 386
  - risk
    - contractor's 123, 189, 231, 243, 308
    - contracts distribute 180, 187
    - owner's 127, 185, 189
  - rough order of magnitude (ROM) estimates 154-5, 167, 386
  - RSMMeans 148, 150, 156, 161-2, 385, 392
- S**
- samples 217, 227, 252, 254, 266, 386-7
  - Santa Monica Freeway 126, 271-3
  - Santa Rosa (CA) Junior College 8-9, 90-1
  - schedule
    - detailed 242, 269-70, 272, 282, 382
    - feasibility 61, 63
    - project's 266, 377
    - updated *see* look-ahead schedule
  - schedule of values (SOV) 235, 335, 337-9, 344-5, 386
  - schematic design 92, 95, 100, 386
  - scope of work 60, 115, 154, 165, 167, 173, 194-5, 246, 301-4, 312-3, 315-6, 324, 327-8, 348-9, 375-7, 386
    - changes 348-9
  - Sebastopol, CA 64-6
  - SectionFormat 223, 226, 386
  - sections (drawing) 94-6
  - sectors 1-3, 10-11, 45, 148, 376, 380, 386
  - self-performing 37, 386
  - sequencing 142, 233, 246, 259, 277, 286, 288-9, 299, 316-7
  - sequential design/construction process 117
  - services, contract administration 36
  - shop drawings 41, 206, 252-3, 255, 264, 266-7, 349, 386-7
  - site selection 60-1
  - software 4, 6, 31, 84, 86, 98, 225, 278, 290, 293, 298; *see also* BIM, IPD
  - Solar for Schools Program 23
  - solicitation *see* invitation to bid
  - SOV *see* schedule of values
  - specialty contractors 37-8, 40, 42-3, 114, 262, 301, 303, 306, 308-9, 379, 386-7
  - specification writers 18-9, 36, 109, 218, 223, 225
  - specifications 96-101, 105, 109, 114, 123-4, 134, 137-8, 167, 191-3, 215-9, 225-7, 254-5, 348, 374, 378-9, 387-8
  - square foot estimates 154-6, 167-8, 387
  - stages, feasibility 46-8, 55, 69
  - standards 8, 18-22, 28-9, 38, 196, 204, 216, 219, 254, 261, 387
  - start of construction 46, 53-4, 79, 84, 95, 112, 116, 126, 242-3, 263, 277, 279, 289-91, 293-7, 299, 387
  - start to finish 293-5, 299, 387
  - start to start 293-4, 299, 387
  - sub-bids 114-5, 118, 234, 303, 384
  - sub-subcontractors 38, 306, 332
  - subcontracted work 106, 145, 302
  - subcontractor 43, 130, 229, 234, 262-4, 288, 302, 307, 309, 321, 332, 387
    - back-charging 248
    - bid packages 270
    - buyout 260
    - first-tier 38, 40, 42, 379
    - managing 262, 301
    - performance 263, 369
    - pre-qualified 140, 302, 307
    - second-tier 38, 40, 42-3, 379, 386
    - selecting 302-3, 305
    - services 302
    - third-tier 43, 386
    - warranties 368
  - subcontracts 150, 154, 165, 234, 241-2, 252, 263, 302-4, 310, 312, 332, 357, 375, 380, 384
    - award of 50, 232
  - submittals 39, 41, 51, 107, 114, 217, 219, 235, 238-40, 251-5, 261-2, 266, 349, 362-5, 367-71, 387
  - substantial completion 51, 53, 240, 269, 282, 321, 362-5, 369-71, 382, 387
  - substantial completion, certificate of 53, 240, 363-5, 371
  - successor activity 289, 291, 293, 299, 387
  - summary schedules 275, 282-3, 387
  - superintendent 39, 43, 146-7, 151, 232-3, 237, 241, 248-50, 256, 263-4, 275, 282, 288, 311, 357, 362
  - supplementary conditions 107, 109, 169, 191, 193, 203, 205, 207, 209-13, 216, 367, 387
  - suppliers 1-2, 40-1, 43, 130-1, 142-3, 147-9, 234, 252-3, 272, 274-5, 311-2, 335-6, 341-3, 353-5, 361-2, 369

## 402 Index

surety 108, 127-34, 256, 265, 341, 364, 368, 375, 387-8  
surety bonds 127-9, 134, 235, 388  
surety program 130, 132, 134, 385, 388  
sustainable construction *see* green construction

### T

take-off 142-3, 150-1, 161, 260, 336, 385, 388  
task sequencing 299, 388  
tasks 32, 50, 114, 141-2, 145-7, 150, 245-7, 273, 276-7, 280, 286-90, 292, 294-7, 299, 378-80, 387-8  
taxes 114, 145, 148, 154, 165, 167, 311, 381  
team members 73, 77, 84, 123, 125, 133, 245  
technology 2-3, 5-6, 357  
termination 205, 209, 212, 265, 388  
testing and inspection agencies *see* agencies, inspection  
time  
    additional 323, 347, 349  
    amount of 32, 52, 80, 266, 290, 299, 377, 379-80  
time impacts 327-8, 357, 375, 385  
timeline 74, 276-7, 280, 282, 288, 296, 374, 382  
title, property 131, 358, 381-2  
Toussaint, Roger 26  
total cost 115, 155, 160-2, 165, 185, 248, 338  
tracking 5, 43, 146, 234, 251-2, 254-6, 258, 260, 262, 266-7, 274, 282, 298, 323, 385-6, 388

### U

unions 5, 10, 26, 145, 150, 383, 388  
unit price 181, 185, 187, 326, 333-4  
    contracts 181, 185-6, 188-9, 334-7, 388  
    estimate 154, 160, 167, 374, 378-9, 388  
    fixed 186, 188, 388  
    projects 336  
United Steelworkers (USW) 26  
U.S. Dept. of Energy 20-21, 23, 28  
U.S. Mayors' Climate Protection Agreement 22  
USGBC (U.S. Green Building Council) 18-9, 27, 29, 381, 388

### V

value engineering 149-50, 318, 388  
vendors *see* suppliers

### W

wage, prevailing 144-5, 150, 384  
wages 5, 38, 145, 150, 237, 383-4, 388  
warranties 53, 80, 223, 247, 254, 304, 308, 364-5, 369-71, 388  
WBS (work breakdown structure) 286-8, 290-1, 299, 389  
work *see* scope of work  
worker productivity 20, 63, 298

### Y

Yudelson, Jerry 17, 27

### Z

zero net energy building 23, 29, 389  
zoning 41, 62-4, 66-7, 69, 389  
zoning map 64-5, 69, 389  
zoning ordinance 64, 66-7, 69, 389