Aquatic facilities, 908–917
  competition swimming and diving pools, 913–917
  public swimming and diving pools, 910–913
  residential swimming pools, 908–910
  tubs, 908, 909
Arched peak connections, 381
Arches, 204, 1013
Architectural area, 1023, 1024
Architectural Barriers Act (ABA), 41, 68
Architectural construction documentation, 142–160
  for building information modeling, 151–159
  construction specifications, 146–151
  drawings, 142–146
  procurement documents, 160
Architecturally exposed structural steel (AESS), 229, 341–342
Architectural panels, 401, 402
Architectural shielding, 902
Architectural volume, 1023–1024
Architectural woodwork, 548–549
Area(s).
  See also Athletic areas; Recreation areas
    architectural, 1023, 1024
    assembly, 626
    audience, 822, 845
    audiovisual viewing, 811–812
    calculations for, 1023
    catchment, 684
    chemical storage, 833
    dining and bar, 846–847
    front-of-house, 846
    high-impact, 607
    net assignable, 1024
    preparation, 818
    private, in schools, 861
    of refuge, 644, 645
    of rescue assistance, 626
    for skylighting, 516
    thermal expansion of, 1022
    urban, 981, 988–991
    for warm-air furnace, 711
Area dividers, rooftop, 502
Area lighting, 1002–1003
Arena football, 827
Arid climates, 88, 89, 282
Armchairs, 857
Armoires, 859
Article titles, 150
Articulation, 102, 105
Art rooms, 865
Ash dumps, 611
Ashlar stone wall patterns, 980
Asphalt, 472, 477
Assembled thresholds, 461
Assembly areas, signage in, 626
Asset resilience, 110
Assistive listening systems (ALS), 56
  ASTM standards:
    on anchoring and reinforcement, 194
    on clay masonry, 182
    on concrete masonry, 185
    on mortar and grout, 191–192
    on reinforcing bar sizes, 170
    on stone, 188
    Astragals, 550
    Astragal weatherstripping, 462
  Athletic areas:
  baseball and softball, 955–957
  box, 962
    field and court construction, 965–966
  hockey, 963
  football, 957–960
  lacrosse, 963
  rugby, 963
    site work for, 955–966
  soccer, 960–962
  track and field, 964
  Audio-visual equipment, 810–816
    audio intelligibility for, 813–814
    design considerations, 810–812
    in presentation rooms, 814
    sight lines for, 812–813
    support spaces for, 814–816
  Audiovisual systems, 773
  Audiovisual viewing area, 811–812
Auditing, security, 126
Autodesk 3DS Max, 151
Automated book storage and retrieval systems, 810
Automatic banking systems, 56
Automatic drip valves and filters, 983
Automatic exhaust dampers/louvers, 436
Automatic intake dampers/louvers, 437
Automatic swing gates, 786
Automatic valve assemblies, 982
Awareness, in universal design, 20
Awnings, 522–524
AWPA (American Wood Preservers’ Association), 238
Axially loaded spread footings, 285
Back-bar storage cabinets, 804
Backboards, basketball, 828
Backfill, 308–310, 935
Backflow prevention, 660, 661, 666, 983
Background sound, 102
Backsplashes, 843–845
Baggage conveying equipment, 658
Bakeries, equipment in, 800–801
Baker’s tables, 801
Balance and center match method, 249
Balance beams, 831
Balanced doors, 461, 578
Balance match method, 249
Balconies:
  concrete, 331–332
  of performance theaters, 105
  in superstructures, 344–345
Ballasts, lighting, 757
Ballast pavers, 567
Ballistics-resistant construction, 125–126, 907–908
Balloon framing, 361
Ball valves, 673
Balustrades, 618, 1014
Bamboo flooring, 593
Banded slabs, 331
Banquettes, 847, 848
Bars (metal):
  door, 464, 584
  grab, 62, 68, 623, 913, 916, 917
  as gymnastics equipment, 830, 831
Bars (pubs):
  area for, 846–847
  casework for, 818
  equipment for, 803–804
  seating in, 846–847, 849
Barber shops, 794–795
Bar ends, decorative, 224
Bar gratings, 222, 606
Bar hooks, 171
Barricades, lift-plate, 782
Barriers:
Brick, (continued)
classification of, 182–183
columns, 202
ledges, 288
pavers, 948–949
projections of, 201
retaining walls, 972
shapes of, 183
sizes of, 183
stairs, 205–206

Brick veneers:
expansion joints with, 319, 514
on exterior walls, 406–408
flashing at, 510
louvers with, 435
on metal building systems, 896

Bridge joints, 317
Bridging, 343, 347, 358
Bronze, 210, 970
Bubbler heads and nozzles, 969, 983
Buffering, 685
Building blocks, 42–44
Building codes:
on fire protection, 732
on floor loads, 330
on interior glazing, 570
on lightning protection, 767
on rainwater harvesting systems, 685
on seismic recording instrumentation, 899
Building control systems, 126
Building ground grids, 766
Building information modeling (BIM), 151–159
applications of, 157
CAD vs., 152
and IFC model, 157–159
Loblolly residence, Taylors Island, Maryland (case example), 152–157
with SectionFormat™, 150
Building-integrated photovoltaics (BIPV), 762
Building-level controllers (BLCs), 725
Building management systems, 773–777
Building modules, 878–880
Building orientation, 74–75, 77–78
Building pressurization, 692
Building resilience, 108–140
assessment of, 140
components of, 108–113
and CPTED, 136–138
good design practices for, 130–136
hazard-specific, 113–114
lifecycle considerations in, 139
maintainability in, 114–115
overview, 108
and planning/design, 127

safety and, 115–121
security and, 122–126
sustainability in, 128–130
Building systems integration, 114–115
Built-in bathtubs, 678
Built-in lavatories, 677
Built-in sinks, 677
Built-up bituminous roofing, 477–479
Bulkheads, 916
Bulkhead sills, 450
Bulk material processing equipment, 655
Bumpers, 620, 781
Burglary-resistant vaults, 888
Burners, heating system, 700
Busway systems, 746
Butt carriers, 836
Butterfly valves, 673
Butt-glazed storefronts, 450
Butt joints, 317
Butt-joint glazing, 268
B-vents, 634
Bypass doors, 448

C

Cabinets:
backing for, 348
bathroom, 764
for fire-suppression equipment, 637, 741
in hotel rooms, 859–860
shop-fabricated, 838–841
Cables:
catenary, 891
and systems furniture, 871–872
telecommunications, 769
Cable crash beams, 782
Cable trusses, 457
CAD (computer-aided design), 152
Call button boxes, 535
Cam lock brackets, 169
Cannon Design, 31
Canopies, 522–525
Cantilevered beams, 344, 369, 1027
Cantilevered floors, 360
Cantilevered slabs, 345
Cantilever needle beams, 290
Cantilever retaining walls, 975
Cap bead, wet/dry glazing with, 269
Cap moldings, 830
Cars:
elevator, 51–52, 642
passenger, 938
Carbon dioxide extinguishers, 743
Carbon steel, 215, 224
Card technologies, 775–776
Carousel customer stations, 787
Carpet flooring, 383, 601–604, 608
Carpet maintenance equipment, 834
Carpet tiles, 601, 604
Car position indicators, elevator, 52
Carrels, 868
Carriers (drapery), 837
Cascading effects, 133–135
Cashier windows, 806
Cash registers, 785, 787
Cathode ceilings, 349
Cathlin, Jack, 28
Caulked joints, 671
Cavity drainage, 197
Cavity walls, 409, 410, 445–446
Ceiling(s), 609–618
access panels in, 589, 590
basement, 312
cathedral, 349
control joints in, 559
finishes for, 611–618
heat transfer through, 724
interior partitions at, 533, 537, 540, 558
non-suspended ceiling construction, 609–610
and open soffits, 246
projectors and screens mounted to, 774
sloped, 387
suspended ceiling construction, 609–610
tongue-and-groove, 382
Ceiling-hung compartments, 622
Ceils, detention, 917
Cellular deck systems, 338, 750
Cement:
integrally colored, 178
masonry, 192
microfine, 292
Portland, 192, 413, 600
SCMs, 175–176
solenoid cement joints, 672
tiles, 476–477
Cementitious coatings, 429
Center glazing, 449
Centers of activity, 818
Central HVAC systems, 698–699
Centrifugal water chillers, 709
Ceramic tile, 477, 551–552, 611, 844
Chairs, 857, 861, 865
Chair rails, 550
Chaise lounges, 857
Channels, 218–220, 615, 616, 996
Channel-and-clip assembly, 596
Channel glass curtain walls, 458
Channel siding, 417
Channel studs, 563
Charbroilers, 800
Check dams, 998
Checkout equipment, 785, 787–788
Checkroom equipment, 794
Check valves, 673
Cheekwalls, 205
Chemical agents, security from, 124–125
Chemical-based fire-extinguishing systems, 732–733
Chemical finishes, for metals, 212
Chemically treated glass, 260
Chemical storage areas, 833
Chests, 859–860
Children:
anthropometric data for, 7–13
furniture for, 861
playgrounds for, 971–972
toilet rooms for, 68
water closets for, 59
Chiller controls, 726
Chimneys, 632, 700, 701
Chimney breasts, 631
Chimney crickets, 507–508
Chimney flashing, 506–507
Chords, 342, 377, 378
Chromium, 211
C-H studs, 534
Chutes, 659
Circuit breakers, 752, 754
Circular stairs, 354
Circulation paths, 45–46
Cisterns, 684
Civil utilities, 993–995
Class A hazards, 742
Classical architecture elements (orders), 1007–1017
arches, 1013
balustrades, 1014
details, 1011
doors, 1014
entasis, 1012
flutes, 1012
hidden, 1016–1017
intercolumnation, 1013
introduction, 1007–1009
moldings, 1009–1010, 1012
pediments, 1015
pilasters, 1012
rustication, 1016
superposition, 1014
volutes, 1012
windows, 1015
Classical revival design, 1008
Classification tables, OCCS, 148
Classrooms, 771, 861–864
Clay masonry units:
brick and tile classification, 182–183
control joints, 198
exterior walls, 405–410
reinforced pilasters, 203
Clean-burning fireplaces, 632–634
Clean dish tables, 802
Cleaning trolleys, 834
Cleanouts, 665
Clean rooms, 881–882
Clearances:
chimney, 632, 700
electrical panelboard, 752
fixed seating, 847
HVAC equipment, 634
knee and toe, 42, 64, 838
laundry equipment, 821
maneuvering, 42–44, 54–55
vending machine, 792–793
window treatment, 836
Clear deck space, 912, 913
Clear glass, 260
Clear repellers, 429
Clear width, 44–45, 54
Climate(s), 86–89
and building shell, 314–316
cold and permafrost, 86–87, 279–280
cold and underheated, 87–88, 281–282
designing for, 86–89
and foundations, 279–283
hot arid, 88, 89, 282
humid, overheated, 88, 89, 282–283
and HVAC systems, 691
and thermal comfort, 90–92
Climate change, 114
Clip angle anchors, 195
Closed risers, 383
Closed soffits, 246, 382
Closed truck docks, 941, 942
Closers, door, 461, 584, 587, 588
Closets, telecommunications, 770
Closures, panel partition, 544
CNC (Computer Numerical Control) machining, 228
Coal tar, 477
Coated foam roofing, 491
Coated glass, 261
Coatings:
cementitious, 429
for concrete, 179, 180, 300, 301
elastomeric, 429
for glass, 186, 569
for metal, 212–213
Code-checking tools (BIM), 157
Coffee tables, 838
Cofferdams, 931, 932
Coffered ceilings, 618
Coffer, metal, 214–215
Coiling doors, 463–464, 583
Coi saddle-type hangers, 168
Coil ties, 168
Coin trays, 806
Cold climates, 86–88, 279–282, 316
Cold deck bypass, 721
Cold-formed steel framing:
for exterior walls, 347, 409, 417, 418, 421
for floors, 343–344
for openings, 347–349
for roofs, 349–350
Cold storage rooms, 883–884
Collar ties, 350
Collector arrays, 705–707, 762–764
Colors, mortar and grout, 192–193
Colored concrete, 178, 399
Colored glass, 262, 567
Color hardeners/densifiers, 178
Color rendition index (CRI), 94
Color temperature, 94
Column cover connections, 401
Column equipment supports, 514–516
Columns:
concrete, 164–166, 174, 334, 335
foundation, 120, 291
glued-laminated, 380–382
masonry, 202–203
post and beam construction, 368, 369
steel, 286, 341
tube, 300
Combination oven-steamers, 800
Combination study-top and desktop, 865
Combined footings, 285
Combined heat rejection, 729
Combustion air, 631, 698
Combustion equipment controls, 726
Comfort, 19, 90–92, 822
shear-resisting, 975
in stone floors, 601
Controlled irrigation, 992
Control panels, 52, 637, 638
Control rooms, AV, 815
Convection ovens, 800, 801
Convection steamers, 800
Conventional trailers, 939
Conventional venting, of gas appliances, 635
Conversion factors, 1020–1021
Convertible furniture, 860–861
Conveying, 642–659
chutes, 659
design considerations for, 642
dumbwaiters, 653
elevators, 642–650
escalators, 652
material processing and handling equipment, 655–658
moving walks, 653–655
of rainwater, 684
wheelchair lifts, 651
Conveyors, 655, 656, 658
Conveyor ovens, 800
Cooktops, 65, 819, 820
Cooling, 90, 693, 708
Cooling loads, 729, 755
Cooling systems, 705, 707, 724
Cooling towers, 708–710
Copper, 210, 221, 670, 903
Corinthian order, 1011
Cork flooring, 604
Corners:
of concrete formwork, 166, 176
of curtain walls, 455
door frame, 577
exterior wall connections at, 395, 398
framing for, 349
glass unit masonry at, 186, 542
masonry for, 202
metal corner conditions, 225
in post and beam construction, 369
siding for, 417
Corner beads, 562
Corner guards, 620
Corner offices, 851–852
Corner posts, 361
Corner tapes, 557
Corner trim, 550
Cornice trim, 550
Corridors, glazing in, 542, 543
Corrosion, 194, 211
Corrugated sheet metal roofing, 499
Cost estimating tools (BIM), 157
Cost information, 148, 150
Counters, 838, 847, 848
Counterflashing, 484, 488, 509–511
Counter shutters, 583
Countertops, 843–845
Cove base, 605
Cove moldings, 550
CPCs (compound parabolic concentrators), 704
CPTED (crime prevention through environmental design), 136–138
Cracking, concrete, 179, 301
Crash rails, 620
Crawl spaces, 288, 303–304
Credenzas, 860
Crib walls, 976
Crickets, chimney, 507–508
Crime prevention through environmental design (CPTED), 136–138
Creep, concrete, 300
Cushioned assembly, of resilient wood flooring, 596
Cushioned sleepers, 595
Cut stone, 189, 190
Cut-through islands, 47
Cutting:
glass, 570
wood veneers, 249
CVDD (constant-volume dual duct) system, 715, 716
Cybersecurity, 126
D
Damage, from natural disasters, 108
Dampproofing, 311–312
Darts, 829
Data files, in MasterFormat™, 150
Data systems, 766, 769
Daylight compensation control, 760
Daylighting, 92–95, 755
DC (direct-current) photovoltaic systems, 763–764
Deal trays, 806
Decay, wood, 236, 237
Deciduous trees, 238
Decimal equivalents, 1019
Deck nozzles, 970
Decks and decking:
composite, 373
concrete, 336–338
flushing at, 510
metal, 337–338, 350–351, 404
for porous paving, 947
root, 350–351, 382, 386, 468, 469, 483, 489, 511
shrinkage of, 236
wood, 371–373, 382
Decorative coatings, concrete, 179, 180, 300
Decorative gas appliances, 635
Decorative metals, 224–228
Decorative pools, 966
Decorative silk-screened glass, 262–263
Decorative thin-wall tiles, 596
Dedicated outdoor air systems, 717
Deep foundations, 293–296
Deep wells, 930
Defects, concrete surface, 178–180
Defensible space, 136
Deflection, 410, 528
Degradation, soil, 989
Degrees, 1021
Dehumidification, 726–728
Density curves, sprinkler design, 733
Dental operatories, 808, 809
Descriptions, preliminary, 148
Desiccant devices, 727–728
Design-build applications, 148
Design intent, 691
Design vehicles, 938–939
Desks, 860, 865
Detailing, metal, 224–225
Detectable warnings, 56, 627
Detection equipment, 805–806
Detention facilities, 917
Dewatering, 930
DFs (drinking fountains), 681–682
Diagonal bracing, 347, 516
Diagonal curb ramps, 47
Dialysis modules, 808
Diffusers, 722
Dimensional lumber, stairs from, 383
Dimensioning, 143, 145, 538–539
Dimension stone, 552, 598
Dimming, of lighting, 755
Dining areas, 846–847
Direct bearing connections, 400, 401
Direct-current (DC) photovoltaic systems, 763–764
Direct-expansion HVAC systems, 698, 699
Directional dependencies, 134, 135
Direct lighting, 755
Direct solar irradiation, 82–85
Direct venting, 635–636
Disabilities, children with, 971
Discipline jurisdictions, 149
Disconnect switches, 752
Discussion style classroom arrangements, 864
Dishwashers (dishwashing equipment), 64, 801–802, 820
Disinfection, 685
Dispatching systems, elevator, 644
Display reach-in refrigerators, 802
Disposal, lamp, 758
Distortion, angular, 283
Ditching, 930
Dividers, 502, 592
Dividing boards, 913
Dividing pools, 910–917
Docks, truck, 941–942
Documentation, 1002. See also Architectural construction documentation
Dolomitic limestone, 552
Domes, 879–881
Domed ceilings, 618
Dome forms, 168
Domestic water distribution, 669–661
Domestic water heaters, 666–668
Doors:
  accessible, 54–56
  acoustic, 898
  ballistic-resistant, 907
  blast-resistant, 467
  classical, 1014
  exterior, 459–467
  glazing in, 542
  interior, 570–583
  kennel, 919
  protection for, 620–621
  radiation shielding, 901
  revolving, 783–784
  in series, 56
  in storefronts, 448–449
Door frames, 208
Door knobs, 584
Door openings, 348, 361, 385, 571
Doric order, 1011, 1017
Double-acting interior doors, 578
Double doors, 571
Double drainage blades, 436
Double facade curtain walls, 458
Double-pitched framed skylight assemblies, 519
Double-stud partitions, 533
Dowel anchors, 410, 555
Dowels, for footings, 289
Doweled beam-to-column connections, 335
Doweled joints, 300, 301
Downfeed water supply systems, 662
Downflow systems, 728
Downspouts, 504, 505
Draft, 423, 703, 709
Drainable blades, 437
Drains and drainage:
  of cavities, 197
  condensate, 703
  in floors, 666
  for plumbing fixtures, 663
  for porous paving, 497–498
  rainwater, 682–685
  for retaining walls, 975
  from roofs, 469–470, 493–495, 501
  sanitary waste, 664, 665
  storm water, 682–683, 994–995, 999
  subdrainage, 302–303
  subsurface systems for, 993–994
  for trenches, 998, 999
Drain-down space heating and domestic hot water solar systems, 705
Drained cavity walls, 318, 392, 514
Draperies, 836–837
Drawers, transaction, 806
Drawings, 142–146
Drawing notations, 150
Dressers, in hospitality rooms, 859–860
Drift, story, 118
Drilled piers, 294
Drinking fountains (DFs), 681–682
Drips, stone, 427
Dryers, 797, 821
Dry gaskets, 427
Dry glazing, 268, 453
Dry, wood shrinkage and, 234
Dry-placed stone retaining walls, 972
Dry siphon joints, 426
Dry wells, 303
Dual condenser water chillers, 730
Dual-duct air distribution, 715
Dual-line expansion joints, 319
Ducts, 721, 750
Duct banks, underground, 1003
Ducted HVAC systems, 711, 712
Duct enclosures, 536
Dumbwaiters, 653
Durability, 113

E

Early childhood classrooms, 861
Earthwork, 924–925
EAS (electronic article surveillance) devices, 805
Ease of passage, 822
Eaves, 349, 350, 387, 472, 476, 477
Eccentric bearing connections, 401
Echo and echo/stress treatment rooms, 808
Economizers, 728–731
Edges:
  acoustic ceiling tile, 610
  concrete, 178
  glass, 570
  gypsum board, 556, 557
  ramp and landing, 51
  roof, 486, 509
  of sports fields and courts, 966
  wood decking, 372
Edge clamps, fabric, 891
Egress, emergency, 627, 644
EIFS (exterior insulation and finish systems), 412–413, 428–429
Elastomeric coatings, 429
Elastomeric membrane roofing, 484–485
Elastomeric pipe insulation, 674
Electrical components, 871, 879, 889, 902
INDEX

1039

Electrical devices, 747
Electrical outlet boxes, 540
Electrical panelboards, 752–753
Electrical services, 744–767
branch wiring, 746–754
busways, 746
facility power generation, 762–765
industry standards, 744
lighting, 754–761
lightning protection, 766–767
low-voltage motor control centers, 746
motor starters, 744–745
substations, 744, 745
sustainability, 744
switchboards, 745
transformers, 744
Electrical trench ducts, 338
Electrical utilities, 1001–1003
Electric heating systems, 696, 711
Electric traction elevators, 643, 646–647, 649
Electric water coolers, 681–682
Electrochromic glass, 568
Electromagnetic spectrum, 93
Electronic article surveillance (EAS) devices, 805
Electronic fire alarm/communications systems, 776
Electronic keyboards, 826
Electronic organs, 827
Elementary classrooms, 862
Elementary water distribution systems, 712
Elevated buildings, 280
Elevated water tanks, 662, 663, 1000
Elevator(s), 642–650
accessibility of, 51–52
cars, 642
electric traction, 643, 646–647, 649
and facility type/size, 645–646
freight, 643, 648–650
hoistway, 642
hydraulic, 642–643, 647–649
lobbies, 642
machine rooms, 642
passenger, 643, 648
planning for, 643–645
traffic in, 650
types and uses, 642–643
Elliptical trainers, 829
Embankments, 931
Embedded flashing, 197
Embedment, retaining wall, 976
EMCS (energy management and control systems), 725–726
Emergency communications, 52
Emergency egress, 627, 644
Emergency fall protection, 470
Emergency lighting, 765, 766
Emergency power quick connects, 136
Emergency response, 127
Emergency showers, 681
Empathy, 1008–1009
Enclosures, 433, 536, 710. See also Exterior horizontal enclosures; Exterior vertical enclosures
End blocks, 136, 542
End islands, 943
End matching, 249
Endoscopy rooms, 809
End walls, 998
End-wall targets, swimming pool, 917
Energy analysis tools (BIM), 157
Energy codes, 755, 1001
Energy consumption:
and building shell, 314, 320–321
and lighting design, 755
and sustainability, 128
Energy-efficient glass, 568
Energy efficient walls, 88, 89, 281–283
Energy management and control systems (EMCS), 725–726
Energy performance ratings, glazing assemblies, 264
Engineered composite stone, 553
Engineered wood flooring, 593
Entasis, 1012
Entertainment, equipment for, 821–833
athletic equipment, 827–833
instrumental equipment, 826–827
theater and stage equipment, 821–826
Entrances, signage for, 626
Entrance floor grids, 607
Entrance mats, 462
Entrance rooms, telecommunications, 768
Environment, 74–105
acoustics, 95–105
climate zones, 86–89
daylighting, 92–95
environmental factors, 74–79
solar radiation, 74–75
solar time, 78–79
Environmental impact, 128
EPDM roofing, 485
e-Plancheck, 158
Epoxy adhesives, 600
Epoxy ester paint, 565
Epoxy joints, stone panels with, 419
Epoxy mortar and grout, 567
Epoxy resin flooring, 606
Equipment, 780–835
accessible parking, 945
commercial, 785–816
entertainment and recreational, 821–833
institutional, 807–821
maintenance, 933–934
solid waste handling, 834–835
vehicular and pedestrian, 780–785
Equipment curb, 502, 515
Equipment rooms, 768, 815
Equipment supports, rooftop, 514–516
Ergonomics, 4
Erosion control, 924–925
Error-checking tools (BIM), 157
Escalators, 652
E studs, 534
Evacuated tubes, 704
Evacuation, 127
Evaporative condensers, 710
Evaporative space cooling, 90
Examination rooms, medical, 808
Excavations, basement, 931–936
lateral support for, 933–936
open-cut, 931
shored, 931–933
Exhaust hoods, 731, 797
Exit devices, 589
Exit lighting, 765
Expansion, wood, 235
Expansion anchors, 255
Expansion control (expansion joints). See also Control joints
in access flooring, 592
in building shell, 317–319
in horizontal waterproofing systems, 494
in masonry, 198–199
at parapets, 512–514
for stucco, 414
watershed concept for, 496
Expansion Mullions, 450
Expansion screens, 562
Expansive soils, 278
Exposed aggregate, 177
Exposed concrete elevations, 166
Exposed mullion louvers, 435
Fireplaces, 627–637
Fireproof materials, 341
Fire protection, 120–121, 732–743
design considerations for, 732–733
fire department connections, 736–738
fire extinguishers, 741–743
fire types, 733
foam extinguishing systems, 742
pumping systems, 738–741
sprinklers, 733–737
standpipes, 736
Fire pumps, 738–739
Fire-rated glass, 569
Fire-rated joint covers, 318
Fire ratings, 470, 741, 742
Fire-resistance design, 127
ceiling suspension systems, 610
of interior partitions, 528, 529
of linear metal ceilings, 617
metal roof decking, 350
openings, 590
treatment of wood for, 238–239
vaults, 888
Fire ratings, 470, 741, 742
Fire-retardant paints, 566
Fire-retardant particleboard cores, 248
Fire-retardant treatment (FRT) wood, 238–239
Fire safety, 370, 637–638
Fire stairs, 645
Fire suppression systems, 127, 732–733
Fit, body, 19
Fitness equipment, 829–830
Fittings, pipe, 671
Flexible joints, in stone floors, 601
Flip-up floodgate doors, 467
Float glass, 566
Floating fountains, 969
Flooding hazards, 119–120
Floors, 590–609. See also Subfloors
access, 590–592, 871
access hatches in, 590
of accessible routes, 45
athletic room, 919
classes of, 298
for cold storage rooms, 883
cement, 331–333
cement reinforcement for, 174
construction assemblies for, 322–325
EIFS rainscreen wall joints at, 412
expansion control for, 317, 318
finishes for, 593–607
glass, 386, 387
glued floor systems, 246
leads on, 330, 331
metal decking for, 337–338
movable pool, 916
radiant heating elements in, 723–724
raised floor construction, 590–592
in saunas, 887
space frame connections at, 347
steel joist framing, 342–344
structural performance of, 592
transitions in, 607–609
wood framing for, 356–361
wood sleeper floor system, 308
Floor anchors, interior door, 576
Floor-anchored compartments, 621, 622
Floor closers, 461
Floor drains, 576
Floor exercise mats, 830
Floor hinge cutouts, 462
Floorplates, gymnastics, 831
Floor service sinks, 678
Floor space, accessible kitchens, 64
Floors, 590–609. See also Subfloors
access, 590–592, 871
access hatches in, 590
of accessible routes, 45
athletic room, 919
classes of, 298
cement, 331–333
cement reinforcement for, 174
construction assemblies for, 322–325
EIFS rainscreen wall joints at, 412
expansion control for, 317, 318
floors, 590–609. See also Subfloors
access, 590–592, 871
access hatches in, 590
of accessible routes, 45
athletic room, 919
classes of, 298
for cold storage rooms, 883
cement, 331–333
cement reinforcement for, 174
construction assemblies for, 322–325
EIFS rainscreen wall joints at, 412
expansion control for, 317, 318
finishes for, 593–607
glass, 386, 387
glued floor systems, 246
leads on, 330, 331
metal decking for, 337–338
movable pool, 916
radiant heating elements in, 723–724
raised floor construction, 590–592
in saunas, 887
space frame connections at, 347
steel joist framing, 342–344
structural performance of, 592
transitions in, 607–609
wood framing for, 356–361
wood sleeper floor system, 308
Floor anchors, interior door, 576
Floor-anchored compartments, 621, 622
Floor closers, 461
Floor drains, 666
Floor exercise mats, 830
Floor hinge cutouts, 462
Floorplates, gymnastics, 831
Floor service sinks, 678
Floor space, accessible kitchens, 64
Floors, 590–609. See also Subfloors
access, 590–592, 871
access hatches in, 590
of accessible routes, 45
athletic room, 919
classes of, 298
cement, 331–333
cement reinforcement for, 174
construction assemblies for, 322–325
EIFS rainscreen wall joints at, 412
expansion control for, 317, 318
floors, 590–609. See also Subfloors
access, 590–592, 871
access hatches in, 590
of accessible routes, 45
athletic room, 919
classes of, 298
for cold storage rooms, 883
cement, 331–333
cement reinforcement for, 174
construction assemblies for, 322–325
EIFS rainscreen wall joints at, 412
expansion control for, 317, 318
finishes for, 593–607
glass, 386, 387
glued floor systems, 246
leads on, 330, 331
metal decking for, 337–338
movable pool, 916
radiant heating elements in, 723–724
raised floor construction, 590–592
in saunas, 887
space frame connections at, 347
steel joist framing, 342–344
structural performance of, 592
transitions in, 607–609
wood framing for, 356–361
wood sleeper floor system, 308
Floor anchors, interior door, 576
Floor-anchored compartments, 621, 622
Floor closers, 461
Floor drains, 666
Floor exercise mats, 830
Floor hinge cutouts, 462
Floorplates, gymnastics, 831
Floor service sinks, 678
Floor space, accessible kitchens, 64
Floors, 590–609. See also Subfloors
access, 590–592, 871
access hatches in, 590
of accessible routes, 45
athletic room, 919
classes of, 298
cement, 331–333
cement reinforcement for, 174
construction assemblies for, 322–325
EIFS rainscreen wall joints at, 412
expansion control for, 317, 318
finishes for, 593–607
glass, 386, 387
glued floor systems, 246
leads on, 330, 331
metal decking for, 337–338
movable pool, 916
radiant heating elements in, 723–724
raised floor construction, 590–592
in saunas, 887
space frame connections at, 347
steel joist framing, 342–344
structural performance of, 592
transitions in, 607–609
wood framing for, 356–361
wood sleeper floor system, 308
Floor anchors, interior door, 576
Floor-anchored compartments, 621, 622
Floor closers, 461
Floor drains, 666
Floor exercise mats, 830
Floor hinge cutouts, 462
Floorplates, gymnastics, 831
Floor service sinks, 678
Floor space, accessible kitchens, 64
Floors, 590–609. See also Subfloors
access, 590–592, 871
access hatches in, 590
of accessible routes, 45
athletic room, 919
classes of, 298
for cold storage rooms, 883
cement, 331–333
cement reinforcement for, 174
construction assemblies for, 322–325
EIFS rainscreen wall joints at, 412
expansion control for, 317, 318
finishes for, 593–607
glass, 386, 387
glued floor systems, 246
leads on, 330, 331
metal decking for, 337–338
movable pool, 916
radiant heating elements in, 723–724
raised floor construction, 590–592
in saunas, 887
space frame connections at, 347
steel joist framing, 342–344
structural performance of, 592
transitions in, 607–609
wood framing for, 356–361
wood sleeper floor system, 308
Floor anchors, interior door, 576
Floor-anchored compartments, 621, 622
Floor closers, 461
Floor drains, 666
Floor exercise mats, 830
Floor hinge cutouts, 462
Floorplates, gymnastics, 831
Floor service sinks, 678
Floor space, accessible kitchens, 64
Floors, 590–609. See also Subfloors
access, 590–592, 871
access hatches in, 590
of accessible routes, 45
athletic room, 919
classes of, 298
for cold storage rooms, 883
Footings:
concrete, 164–166
connections of exterior walls and, 393, 395
dowel and keyway requirements for, 289
pole construction, 368
for shallow foundations, 285–286
waterproofing at, 311
for wood decks, 373
Forced-air units, 698
Forced entry, resistance to, 126
Forces:
on retaining walls, 972
seismic, 118–119, 363
thermal, 78
wind, 78, 363, 470, 984
Ford Elementary School, 21
Forest certification, 236
Formed concrete pool walls, 910
Formed footings, 165
Formed glass, 568
Formed sheet metal roofing, 499
Form liners, 177–178
Form ties, 168
Formwork, concrete, 164–169
accessories for, 168–169
for columns and footings, 165–166
components, 164–165
general, 164
insulating concrete forms, 384
precast permanent, 401
for slabs and beams, 167–168
for walls, 166–167
Foundations, 283–298
climatic foundation issues, 279–283
drainage from, 302
dual-line expansion joint termination at, 319
EIFS rainscreen wall at, 413
flood-resistant, 120
floor joists bearing on, 394
insulation for, 312
for masonry fireplaces, 631
reinforcement of, 292
settlement of, 283–284
shallow, 285–289
space beams at, 368
special, 293–297
standard, 284
stone spandrels at, 419
underpinnings for, 285–289
Foundation drainage piping, 993
Fountains, 966–971
4Rs of building resilience, 109–110
400 meter track, 964
Footings: (continued)
Four-pipe fan-coil systems, 718
Four-sided structural silicon glazing, 455
Frames and framing. See also Cold-formed steel framing; Metal framing; Structural framing; Wood framing
for awnings, 522–524
of building modules, 878–880
for ceilings, 614
concrete, 334–336, 901
for crawl spaces, 304
for doors, 208
for exterior walls, 347
face frames, 389–410
for floors, 342–344, 356–361
of glazed panels, 544
gypsum board, 559
for interior partitions, 528–533
for metal building systems, 896
moment-resisting frames, 340
platform, 357–358
for roofs, 349–350, 374–382
for skylights, 517–520
space frames, 345–347, 880–881, 893
subhearth air frames, 631
for windows, 442–444
Freestanding bathtubs, 678
Freestanding concrete stairs, 339
Freestanding furniture systems, 869–871
Freestanding garden walls, 976–981
Freestanding objects, 46
Freestanding safes, 804
Freewalls, 836–876
fixed, 836–849
movable, 849–876
Furring, 414, 527, 559, 615
Fuses, 752
Fused glass, 568, 569
Function, building, 130
Functional planning, 4–72
accessible design, 39–41
human factors, 4–18
technical criteria, 42–77
universal design, 19–38
Gable roofs, 246, 374, 382, 387
Galvanic corrosion potential, 197
Galvanic series, 211
Gambrel roofs, 374
Garden walls, freestanding, 976–981
Gas appliances, 634–636, 702
Gas-based systems, fire protection, 732
Gas burning fireplaces, 634–635
Gas-fired heaters, 696–698, 702
Gaskets, 517
Gate valves, 672–673
Gates, pedestrian security, 785, 786
Gateways, 672–673
General acute care rooms, 807
General Services Administration (GSA), 899
Generators, engine, 765–766
Geotechnical investigations, 275
Geyser nozzles, 970
GFIC (ground-fault circuit interrupter) receptacles, 754
Girders, 335, 370
Glare control, 517, 755
Glare protection, 984
Glass, 260–269
in athletic rooms, 919
for daylighting, 95
flooring, 385, 387
glazing materials in window units, 265–269
for interior windows, 566–569
piping, 670
product types, 260–263
and solar gain, 263–265
standards, 260
in storefront systems, 449
supports for long-span curtain wall, 458
thermal resistance values of glazing, 263
Glass canopies, 525
Glass doors, 582–583
Glass fiber-reinforced concrete (GFRC), 401–402
Glass fiber-reinforced gypsum (GFRG), 617–618
Glass-reinforced gypsum (GRG), 639
Glass-sheathed greenhouses, 894
Glass stops, 581
Glass unit masonry, 185–186
block types for, 186
for exterior walls, 410–411
installation of, 206–208
for interior partitions, 541–542
mortar, 185
Glass washers, 803
Glazed curtain walls, 447–450
Glazed structures, 893–897
Glazing:
  of ceramic tile, 551, 596
  of curtain walls, 454, 455
dry, 268, 453
  of interior doors, 581
  of interior partitions, 542–544
  of interior windows, 568–570
  for skylights, 517, 518
sloped, 346
in storefront systems, 449–450
thermal resistance values of, 263
of window units, 265–269, 441
Glass globe valves, 673
Glue chip glass, 569
Glued floor systems, 246
Glued-laminated construction, 370, 379–382
Goosenecks, 698
Grab bars:
in bathrooms, 62, 68, 623
in pools, 913, 916, 917
Grade:
curtain walls at, 456
foundations at, 286
for interior doors, 573, 575
in parking lots, 944
of resilient wood flooring, 595
Grade beams, 287
Grading (situwork), 924, 936–937, 987–988
Grading, of wood and wood products, 235, 240
Grand acoustic pianos, 826
Granite, 187, 189, 552, 599
Graphic standards, 1007
Graphic symbols, 143
Grass paving, 952
Grates and gratings:
floor, 605–607
metal, 222–223
storm drainage, 997–998
Gravel pads, 87, 280
Gravel stops, 512
Gravitational loads, 115
Gravitationally held panel systems, 591
Gravitationally retaining walls, 974
Graywater systems, 685–688
Graywater wastewater management, 991–992
Grease interceptors (grease traps), 669
Greenhouses, 893–894
Greenstone, 552
Greiner Hall, State of New York University (Buffalo, New York), 31–33
Grid-connected photovoltaic systems, 763, 764
Griddles (grills), 800
Grid systems, curtain wall, 454
Grills (griddles), 800
Grilles, 463, 464, 606–607, 722
Grillwork installation, 225
Groove welds, 228–231
Ground-coupled water loop heat pump, 720–721
Ground cover plantings, 984–986
Ground-fault circuit interrupter (GFCI) receptacles, 754
Ground freezing, 934
Ground grids, 766
Grounding, wall shield, 905
Ground motion data recording, 899
Ground-mounted air structures, 892
Ground surface, accessible route, 45
Group number, plywood, 240–241
Grout and grouting:
ASTM specifications for, 191
for ceramic tile, 597
materials in, 192–193
recommended types, 192
for reinforcing foundations, 292
for stone panels, 555
Grouted thread bar anchorage, 334
GSA (General Services Administration), 899
Guards, tree, 990
Guards, 521, 590
Guards, 504–506, 521
Guiderail jambs, 463
Guidelines, defined, 39
Hanger, 990
Handrails:
  with bumper cushions, 620
  for ramps, 50, 620
  in shaft walls, 535
  for stairs, 350, 954
  for swimming pools, 912
Handrails:
  concrete formwork, 168
  gutter, 505
  isolation, 612
  piping, 674
  plastic, 564, 613
  stair, 535
Hard-surface floor maintenance equipment, 834
Hardened utility risers, 124
Hard material support, piping, 674
Hard-surface floor maintenance equipment, 834
Hardware, door, 461–467, 583–589
Hardwood, 236, 248
Harmony, 1008
Hatches, 521, 590
Hazard-specific building resilience, 113–114
HDD (Heating Degree Days), 91
Headboards, 860
Headers:
curtain wall, 455
EIFS rainscreen wall, 412
metal framing for, 348
in shaft walls, 534
stone, 423
stone spandrels at, 419
storefront, 450
window, 444–446
Headroom, for sectional doors, 466
Heads, sprinkler, 733–734
Headwalls, 808, 998
Healthcare facilities, 69, 692
Hearing testing (audiology) spaces, 808
Hearth (masonry fireplaces), 630, 631
sheathing, 244
stone panels on, 554
Gypsum lath, 563
H
Hair interceptors, 669
Hair styling stations, 795
Halogen incandescent lamps, 758
Halon alternatives, 732
HAM, see Heat, air, and moisture
Handling, of doors, 578
Handles, door, 584
Handling capabilities, elevator, 645
Hangers:
  concrete formwork, 168
  gutter, 505
  isolation, 612
  piping, 674
  plastic, 564, 613
  stair, 535
Hanging garment conveyors, 794, 795
Hardboard panel cores, 248
Hardened utility risers, 124
Hard material support, piping, 674
Hard-surface floor maintenance equipment, 834
Hardware, door, 461–467, 583–589
Hardwood, 236, 248
Harmony, 1008
Hatches, 521, 590
Hazard-specific building resilience, 113–114
HDD (Heating Degree Days), 91
Headboards, 860
Headers:
Heat: of lighting, 755
solar position and, 82–85
Heat, air, and moisture (HAM):
for clay masonry walls, 405–406
and climate, 315
for CMU walls, 402, 403
controlling, 315–316
with EIFS systems, 429
for GFRC walls, 402
for insulated metal panel walls, 425
for metal cladding panels, 427
for panelized wall cladding, 423
for precast concrete walls, 399
for rainscreen panels, 411
for stone panel walls, 420
for stucco walls, 413
for tilt-up concrete walls, 393
Heat-absorbing glass, 260, 261
Heaters, 887, 909
Heat exchangers, 731
Heat-fused joints, 672
Heat generation, 699–707
boilers, 699–700
breccings, chimneys, and stacks, 700–701
condensing furnaces, 703
gas-fired equipment, 702–703
solar systems, 703–707
Heating, ventilating, and air-conditioning (HVAC), 691–731
in athletic rooms, 919
control systems for, 725–731
delivery components, 722–725
design considerations for, 691–694
distribution arrangements and components, 711–721
heat generation components, 699–707
penetrations of radiation shielded rooms for, 902
refrigeration components, 707–711
source components, 699–711
system types, 694–699
Heating Degree Days (HDD), 91
Heat loss, in windows, 264
Heat pipes, 730
Heat pumps, 708, 719–721, 731
Heat-recovery systems, 730–731
Heat rejection methods, 729
Heat-strengthened glass, 567
Heavy fixture attachment, framing for, 348
Heavy timber construction, 234, 382
exterior walls in, 429–430
framing for, 365–366
Heavy vehicular paving bricks, 948
He-bolts, 169
Hedges, stone, 980
Helical anchors, 296
Helical inserts, 257
Helicoidal concrete stairs, 340
Hems, canopy and awning, 523
Hidden classical architecture elements, 1016–1017
HID (high-intensity discharge) lamps, 758–759
High chairs, 861
High-density shelving, 872
Higher order dependencies, 134, 135
High-impact areas, flooring for, 607
High-intensity discharge (HID) lamps, 758–759
High-performance louver blades, 437
High-pressure sodium (HPS) lamps, 759
High-rise fan-coil units, 723
High schools, 863, 959–960, 962
Hinges, 586–587, 840–841
Hinged gratings, 223
Hinge pins, 586
Hip roofs, 374
Hockey, 831–832, 920–921
Hoistways, 642, 646
Hold-down clips, 612
Holdings, door, 585, 587
Hollow hydraulic elevators, 647–648
Hollow-core doors, 579
Hollow metal doors, 574–576
Hollow wall anchors, 255
Hoods:
exhaust, 731, 797
fume, 816
vent, 819, 820
Hook-and-pin panels, 427
Horizontal bars, 831
Horizontal enclosures, see Exterior horizontal enclosures
Horizontal expansion control, 317–318
Horizontal storm drainage piping, 683
Horizontal waterproofing, 493–495
Hoses, fire-suppression, 740–741
Hose bibbs, 679
Hot climates, 88, 89, 282–283, 316
Hot fluid-applied roofing, 492
Hot water, temperature of, 667, 668
Hot water demand, 667, 668
Hot water generators, 668
Hot water systems, solar, 704–705
Housed stringers, 384
HP (high-pressure sodium) lamps, 759
HP steel shapes, 217
Humans, attributes of, 4–5
Human behavior, 4–5
Human factors, 4–18
anthropometric data, 4–18
anthropometrics field, 4
in audiovisual design, 813
in ergonomics, 4
human behavior, 4–5
in lighting design, 755
Humid climates, 88, 89, 282–283, 316
Hydrated lime, 192
Hydraulic elevators, 642–643, 647–649
Hydropneumatic tank system, 663
Hydrotherapy baths, 908, 909
Hydrotherapy rooms, 796
Ice chests, 803
Ice cream cabinets, 802
Ice hockey, 831–832, 920–921
Ice lenses, 86, 279
Ice machines, 817
Ice rinks, 919–922
Ice wedges, 86, 279
ICFs (insulating concrete forms), 384
ICS (Integrated collector-storage), 705
ICU (intensive care unit), 807–808
Identification signage, 624
Identity symbols, 143
IFC (Industry Foundation Class) model, 157–159
IfcWall, 158
1-Joists, 359, 364, 375–376
Illuminance, 756–757, 760
Imaging rooms, 809
Impact loads, 330
Impact noise, 98–99
Incandescent lamps, 758
Inclined ladders, 353
Inclined wheelchair lifts, 53–54
Increased-privacy compartments, 621
Index of refraction, 1022
Indicator valves, 1000
Indirect ambient lighting, 755
Induced draft, 703, 709
Induced-draft cooling towers, 709
Induction air distribution, 717
Induction lamps, 759
Induction units, 723
Industrial-grade particleboard cores, 247
Industrial wood block flooring, 595
Industry Foundation Class (IFC) model, 157–159
Industry standards, glass, 260
Inert gases system, 732
Infants, anthropometric data for, 4–5
Infill wood studs, 429
Infrared heating units, 698
Ingredient bins, rolling, 801
Inlets, 999–1000
Insect damage, in wood, 236
Inserts, glass block, 186
Insert flashing, 509
Installation:
of carpet, 603–604
of ceramic tile, 551–552
of composites, 252–258
of curtain walls, 451
of elevators, 643, 644
of exterior doors, 459, 464
of fire-suppression equipment cabinet, 742
of flooring, 593–594, 597–598
of glass doors, 582
of masonry, 208–209
of metal, 228–231, 350
of non-suspended ceilings, 611
of piping insulation, 674
of plastics, 252–258
of roofing, 473
of stone, 553–556, 597–598
of sump pumps, 670
of vaults, 887–888
of windows, 443–447
of wiring, 897
Instantaneous-type water heaters, 668
Institutional equipment, 807–821
audio-visual, 810–816
laboratory, 816–817
library, 810
medical, 807–810
residential, 817–821
Instrumental equipment, 826–827
Insulated metal panel wall assemblies, 424–425
Insulating concrete forms (ICFs), 384
Insulating glass, 260–261, 268, 568
Insulation:or basement walls, 312
board, 414, 431
in crawl spaces, 303
for ducts, 721
in EIFS systems, 428
and horizontal waterproofing, 494
for piping, 673–674
rigid insulation sheathing, 245
for roofs, 469
Insulators, acoustic, 616
Insurance coverage, 470
Integrally colored cement, 178
Integrated collector-storage (ICS), 705
Integrated construction, 878
Integrated frame building modules, 878–879
Integrity, structural, 127
Intelligibility, 813–814
Intensive care unit (ICU), 807–808
Interactive fountains, 978
Interceptors, sanitary waste, 668–670
Intercolumnation, 1013
Interfaces, 642, 650, 756
Interference body bolts, 256
Interior (building):
climatic influence on, 315–316
construction of, 528–639
column covers, 639
doors, 570–590
finishes, 546–566
fireplaces and stoves, 627–637
fire safety equipment, 637–638
floors, 590–609
partitions, 528–546
of performance theaters and rehearsal halls, 103
railings, 618–619
signage, 624–627
specialty components, 618–639
storage, 638–639
toilet compartments and accessories, 621–624
wall and door protection, 620–621
windows and glazing, 570–578
interior detection systems, 777
interior doors, 570–583
for access panels, 548–549, 589–590
design considerations for, 578–583
hardware for, 583–589
radio frequency shielding for, 904
terminology for, 570–571
types of, 572–578
interior finishes, 546–566
ceramic tile, 551–552
gypsum board, 556–561
plaster, 561–564
stone wall panels, 552–556
wall coverings, 564–566
wood, 546–550
interior foundation walls, 288, 289
interior landscaping, 875–876
interior offices, 849
interior panels, 243
interior partitions, 528–546
concrete masonry units, 538–541
glass unit masonry assemblies, 541–542
 glazed partitions, 542–544
gypsum board assemblies, 528, 532–533
metal stud framing, 529–533
operable panel partitions, 545–546
protection for, 620–621
shaft wall assemblies, 533–537
wood stud framing, 528–533
interior ramps, 953
interior stairs, 953
interior windows, 566–570
applied films, 569
cutting and edge treatments, 570
glass, 566–569
glazing, 570
mirrors, 569
surface textures, 569
interior woodwork, 239
interlocking pavers, 951
intermittent fillet welds, 231
internal reflection, 1022
internal shelters, 116–117
internal support, for excavations, 933
interoperability, 157
intersecting members, metal detailing, 224
intersections, 20, 348, 375
intumescent paints, 565–566
ionic order, 1011
iron, 210, 224
irradiation, solar, 82–85
irrigation, 686, 981–984, 992
isolated (sound-conditioned) rooms, 884–885
isolation clips, 899
isolation hangers, 612
isolation joints, 300
isolators, 885
J
jackets, piping, 674
Jack rafters, 374
jamb(s):
doors, 348, 459, 462, 463
EIFS rainscreen walls at, 413
of metal building systems, 897
window, 444, 445
jamb struts, 553
janitor carts, 834
janitorial closets, 833
jet grouting, 292
johnson, philip, 1007
joints:
in clay masonry, 409
in concrete slabs, 299–301
Joints, (continued)
in concrete walls, 399
dry spline, 426
in EIFS systems, 411, 412, 428–429
formwork, 164, 176–178
in GFRC walls, 402
GFRG finishing for, 639
in heavy timber construction, 366
in horizontal waterproofing systems, 494, 495
interior finishes at, 566
masonry panel, 424
mortar and grout at, 193, 194
movement, 198–199, 566, 597, 601
movement of water across, 392
in piping, 671–672
in plaster, 562
prequalification of, 230
reinforcement of, 196
in retaining walls, 974, 975
in siding, 415–417
slip, 532
in stone floors, 601
in stone masonry, 190–191
in stone panels, 419, 420, 555
in stucco, 414
and thermal movement of building shell, 316–317
welded, 225, 341, 401
in wood, 235, 373, 549
Joint tapes, 560, 561
Joists:
ceiling, 375
floor, 385, 386
heavy timber, 429
skip, 332
steel, 247, 342–344, 382
wood, 358–361, 364
Joist slabs, 332
J-runners, 533
Judo, equipment for, 832
Junior high school classrooms, 862
K
Karate, equipment for, 832
KEE roofing, 485
Kennels, 918–919
Kerfed-edge acoustic ceiling tile, 611
Keyboards, 826
Keyed construction joints, 177
Keyway requirements, 289
Kieran Timberlake Associates (KTA), 152
Kindergarten classrooms, 861, 862
Kingposts, 378
Kiosks, 788
Kitchens:
accessible, 63–66
design considerations, 817
equipment in, 817–820
exhaust from, 731
fire-extinguishing systems for, 733
layouts for, 818
lighting in, 22
Knee clearances, 42, 64, 838
Knee walls, 308
Knitted carpet, 603
Knockdown frame, 575
Koning Eizenberg Architecture, 19
KTA (Kieran Timberlake Associates), 152
Laboratories, 816–817, 841–842
Lacrosse fields, 963
Lactation room, 22
Ladders, 352–354, 916–917
Lag bolts, 255
Lamina, EIFS system, 428
Laminates, for panel products, 248
Laminated countertops, solid-wood, 843
Laminated decking, 373
Laminated glass, 261, 567
Lamps, 757–759
Lamp color stability, 756
Lamp life, 755, 758
Lamp lumen degradation (LLD), 756
Lamp replacement schedule, 755
Landings, 50, 51, 953, 954
Landscaping, 981–988
construction around existing trees, 986–988
irrigation system for, 981–984
movable furnishings, 875–876
rooftop plantings, 991–992
tree planting in urban areas, 988–991
trees, plants, and ground covers, 984–986
urban tree rooting, 981
LANs (local area networks), 772
Lap joints, 317, 366
Lap siding, 415
Lateral bracing attachments, 347
Lateral file cabinets, 874
Lateral loads, 115
Lateral support, for excavations, 933–936
Latex-modified portland cement mortar, 600
Latex paint, 565
Latex resin flooring, 606
Lath, 413, 562–564, 613, 614
Laundry chutes, 659
Laundry facilities, 796–797, 821
Lavratories, 676–678
accessibility of, 57
adjustable-height, 19
mounting heights, 680
supports for, 681
Lawns, 990
Law of reflection, 1022
Law of refraction, 1022
Laws, defined, 39
LCM Architects, 28
Lead, 210, 900–902, 905
Leaded stained glass, 567
Lead-lined block in concrete frame construction, 901
Lead sheet in wood construction, 901
Leaf screens, 684
Leakage, water, 433
Learning spaces, 863
Leasing, of interior landscapes, 875
LECs (local equipment controllers), 725
Lecture halls, 103, 845–846
Lecture-style classroom arrangements, 864
LED (light-emitting diode) lamps, 759
LEED credits, 984
Legislative process, accessible design, 39
Legitimate activity, 136
Level, changes in, 136
Level bearing, thresholds with, 463
Libraries, 810, 867–868
Lifecyle, 128, 139
Life safety/security infrastructure, 132–134
Lifts:
pool, 912
wheelchair, 53–54, 651
Lift clearance, 466
Lift crash gates, 782
Lifting capacity, 912
Lift-plate barricades, 782
Light, speed of, 1022
Light-emitting diode (LED) lamps, 759
Lighting, 754–761
in athletic rooms, 919
in conference rooms, 853
controls for, 760
design considerations for, 754–756
exit and emergency, 765, 766
for fountains, 968
illuminance, 756–757
interfaces for, 756
in kitchens, 22
lamps, 757–759
and light trespass/pollution, 761
luminaires, 759–760
of site, 1001–1003
terminology for, 754
Lighting fixtures, 611, 755
Lighting protection, 766–767
Lightning rods, 766
Light pollution, 761
Light reflectance (LR), 609–610
Light-traffic brick pavers, 948
Light transmission, 186
Light trespass, 761
Light trucks, 938
Lightweight mobile modular buildings, 879
Limestone, 187, 189
Limiting heights, for interior partitions, 530–531
Linear distance, 1021
Linear expansion coefficients, 1022
Linear metal ceilings, 616–617
Linear speed, 1021
Linen chutes, 659
Linen production, daily, 659
Liners, concrete form, 177–178
Line symbols, 146
Linoleum flooring, 604
Lintels, 199–200, 362, 421, 631
Lips, fountain, 967
Lippage, 555
Liquid desiccant systems, 728
Little League baseball fields, 956
Live loads, 330, 331
LLD (lamp lumen degradation), 756
Loads:
cooling, 729, 755
electrical, 748
on floors, 330, 331
gravitational, 115
impact, 330
lateral, 115
for lintels, 199
live, 330, 331
moment, 285
for partitions, 528
shear, 285
static, 1025–1028
Lead-bearing walls and partitions:
headers for, 348
joist framing at, 343, 344
rafters and, 381
reinforcement for masonry, 405
wood framing of floors at, 359
Loading docks, 780–781
Lead plates, 300
Loam, 274
Lobbies, elevator, 51, 642–644
Lobby waiting times, 646
Loblolly residence (Taylors Island, Maryland), 152–157
Local area networks (LANs), 772
Local equipment controllers (LEC), 725
Local HVAC systems, 696–698
Locks, 499, 585
Lockers, 638
Locker rooms, 638
Logs, sawing, 235
Long-span structures, 320–321, 342, 457
Long-term performance, 113–114
Long-term resilience planning, 139
Loose-laid ballasted sheets, 485
Lounge chairs, 857
Lounge furniture, 857–858, 868
Louvers, 434–437, 698
Love seats, 857, 858
Low-emissivity coatings, 836
Low-emissivity glass, 568
Low-iron glass, 568
Low-pressure sodium (LPS) lamps, 759
Low slope roofs:
characteristics and considerations with, 468–469
coverings for, 477–499
design of, 469–470
Low-voltage motor control centers, 746
Low-voltage screen controls, 775
LPS (low-pressure sodium) lamps, 759
LR (light reflectance), 609–610
L steel shapes, 217
L-type retaining walls, 973
Lug sills, stone, 191
Lumber:
grading of, 235
as interior finish material, 234
production of, 234–235
thickness of, 235
Lumber forms, concrete, 165
Lumen maintenance, 758, 760
Lumen method, 757
Luminaires, 757, 759–760
Maintenance equipment, 833–834
Major League Baseball, 955–956
Maneuvering clearances, 42–44, 54–55
Manholes, 999–1000, 1003
Mansard roofs, 374
Manufactured concrete formwork, 164
Manufactured engineered structures, 893–897
Manufactured-fabricated rooms, 881–889
clean rooms, 881–882
cold storage rooms, 883–884
paint booths, 888–889
saunas, 885–887
sound-conditioned rooms, 884–885
steam baths, 887
vaults, 887–888
Manufactured gas burning fireplaces, 634–635
Manufactured playground equipment, 972
Manufactured window units, 265–269, 441
Marble, 187–189, 522–523, 599
Marine-grade plywood, 241
Marsh systems, shallow, 927, 928
Masonry, 182–208
accessories for, 197–198
anchorage and reinforcing, 194–199
basement walls, 305
clay units, 182–183
components of masonry work, 182–185
clean rooms, 881–882
cold storage rooms, 883–884
paint booths, 888–889
saunas, 885–887
sound-conditioned rooms, 884–885
steam baths, 887
vaults, 887–888
Masonry cement, 192
Masonry fireplaces, 627–631
Masonry garden walls, 978
Masonry heaters (masonry stoves), 634
Masonry site steps, 979
Masonry ties, 195–197
Mass, thermal, 90
Massage rooms, 796
MasterFormat™, 147, 149–150
Matching, for wood veneers, 249–251
Material processing and handling equipment, 655–658
Materials:
ballistic-resistant, 908
ceiling, 616
Materials, (continued)
for fabric structures, 890
for food service equipment, 798–799
movement of, 198
non-suspended ceilings, 611
piping, 670–674
playground, 971
porous paving, 946–947, 995–996
resilient flooring, 604
sound absorption properties of, 95–97

Materials symbols, 146
Mat foundations, 296, 297
Mathematical data, 1019–1024
Mats, floor, 606–607
Maximum allowable height, 940
Maximum allowable length, 940–941
Maximum allowable width, 940
MC steel shapes, 217
MDF (medium-density fiberboard) cores, 248
Mechanical anchoring systems, 555
Mechanical components, 879, 895
Mechanical draft cooling towers, 710
Mechanical finishes, metal, 212
Mechanically attached sheets, 485
Media, communication, 767
Medical equipment, 807–810
Medical facilities, 689–690
Medium-density fiberboard (MDF) cores, 248
Medium-heat chimneys, 701
Medium-voltage electrical distribution, 1002
Medium-voltage switchgears, 1002
Meeting edge, double door, 571
Membranes:
air barrier, 433–434
horizontal waterproofing, 493–494
poured flooring, 605–606
Membrane roofing:
elastomeric, 484–485
modified bituminous, 479–484
protected, 492
thermoplastic polyolefin, 485–490, 503–504
Men:
anthropometric data for, 14–15
toilet rooms for, 68
Mercantile equipment, 785–796
barber shops, 794–795
beauty shops, 794–795
checkroom, 794
pet grooming, 796
retail, 785, 787–789
spas, 796
vending, 790–794
Mercury, in lamps, 758
Mercury-vapor (MV) lamps, 759
Mesh supports, concrete, 169
Metal(s), 210–231
balconies, 344–345
characteristics of, 210–211
decorative, 224–228
door jams, 459
exterior wall panels and cladding, 424–427
finishes on, 212–213
fixed ladders, 352–354
installation guidelines and construction tolerances, 228–231
practices with, 211–213
properties of, 210–211
sectional doors, 465
space frames, 345–347
structural framing, 340–344
superstructure components, 340–355
typical products, 216–223
utility trench drain assemblies, 998
Metal bead, 558
Metal building systems, 894–897
Metal ceilings, 616–617
Metal cladding panels, 425–427
Metal decking, 337–338, 404, 476
Metal detectors, 805
Metal facade panels, 427
Metal framing. See also Cold-formed steel framing
for ceilings, 615
as conductor, 766, 767
for exterior walls, 347–348
for interior partitions, 529–533
for openings, 347–351
siding on, 417
space frames, 345–347
stone panels on, 417–422, 553, 555
stone veneer on, 421
Metal furring channels, 615
Metal guardrails, 344–345, 619
Metal halide (MH) lamps, 759
Metal lath, 562, 563, 614
Metallic jackets, insulation with, 674
Metal louvers, 434–437
Metal panel wall assemblies, 424–425
Metal plate connectors, 377
Metal roofing, 495–501, 513
Metal roofing tiles, 477
Metal stairs, 351–355
Metal trim, 558
Metal-web wood joists, 364
Meters, water, 666
Methyl methacrylate flooring, 606
Metric units, for construction, 1019–1021
MH (metal halide) lamps, 759
Microelectronics clean rooms, 882
Microfoil cement, 292
Microwave ovens, 820
Middle school classrooms, 862
Mineral composition cores, door, 580
Mineral-fiber cement tiles, 476–477
Mineral-fiber reinforced cementitious panels, 415
Minimum operating pressures, 662
Minipiles, 296
Mirrors, 569
Mitered hip roofs, 475
Miter joints, 549
Mitigation, of cascading effects, 133, 135
Mixed climates, 316
Mobile buildings, 878, 879
Modern fireplaces, 629–630, 633–634
Modified bituminous membrane roofing, 479–484
Modular concrete panel vaults, 488
Modular panel rooms, 904
Modular plug-in electrical distribution, 751
Moisture. See also Heat, air, and moisture (HAM)
controlling, 935
density of soils, 935
in wood, 234–236
Moisture-resistant cores, 428
Molded ties, 611
Moldings:
classical, 1009–1010, 1012
transition, 607
wood, 547–540
Moment loads, 285
Moment-resisting frames, 340
Mortar, 191–194
ASTM specifications for, 191
ceramic tile, 597
for glass unit masonry, 185
joists and, 193, 194
materials, 192–193
recommended types, 192
stone flooring, 600
Mortar beds, 562
Mortise-and-tenon joints, 366
Mosaic tiles, ceramic, 596
Motor control centers, 746
Motor starters, 744–745
Mounted tiles, 596
Mounting brackets, ladder, 354
Mounting flanges, window, 444
Movable floors, 600
Movable furnishings, 849–876
children’s furniture, 861
convertible furniture, 860–861
file systems, 873–874
hospitality furniture, 858–860
interior landscaping, 875–876
library furniture, 867–868
office furniture, 849–856
restaurant seating, 874–875
school furniture, 861–867
seating, 856–858, 874–875
shelving, 872–873
systems furniture, 868–872
Moveable cleats, 496
Movement, building, 316–319, 439
Movement joints, 198–199, 566, 597, 601
Moving ramps, 654–655
Moving walks, 653–655
M steel shapes, 217
Mullions, 269, 450, 452, 453, 455
Mullion louvers, 435
Multicolor coatings, 566
Multifamily dwellings, 138
Multihazard needs, 134–136
Multilane vehicle entry control point, 132
Multimedia conference rooms, 816
Multiple-aisle seating, 103, 823
Multiple-grid skylight, 521
Multipurpose dry chemical extinguishers, 743
Multisensory intersections, 20
Multisensory streetscapes, 20
Multizone air distribution, 714
Multizone air handling units, 721
Murphy beds, 860–861
Museums, restrooms in, 71
Musical instruments, 826–827
MV (mercury-vapor) lamps, 759
Nailable baseplates, 348
Nails and nailing:
of glued floor systems, 246
of roofing, 473
of softlites, 247
of subflooring, 246
of underlayment, 245–246
for wood, plastics, and composites, 253–254
Nailers, 382, 430
Nail-in-channel assembly, 596
National Collegiate Athletic Association (NCAA), 958, 961
National Football League, 957, 958
Natural access control, 136–138
Natural barriers, 129–130
Natural conditions, for long-span structures, 320
Natural constants, 1022
Natural convection units, 698
Natural disasters, 108
Natural draft cooling towers, 710
Natural gas systems, 662–663
Natural surveillance, 136–138
Natural wetland systems, 925–926
NC (noise criteria), 105
NCAA (National Collegiate Athletic Association), 958, 961
NCS (U.S. National CAD Standard), 142
Needle beams, 290
Needle punched carpet, 603
Neoprene expansion joint assemblies, 513
Net assignable area, 1024
Neurosciences Institute (La Jolla, California), 22–27
NFRC identification mark, 265
Nickel, 210
90-degree turns, curb ramp with, 47
NIST (U.S. National Institute of Standards and Technology), 127
Node connections, space frame, 346, 893
Nodular tiles, 611
Noise, impact, 98–99
Noise criteria (NC), 105
Noise reduction (NR), 98, 99, 103, 885
Nonferrous metal, 210–211
Non-load-bearing partitions and walls, 360, 404, 540
Nonmetallic jackets, insulation with, 674
Nonresidential HVAC systems, 711–712
Non-suspended ceilings, 609–610
Nosing, stair, 350, 384, 609
Notched bearing condition, 381
Nozzles, fountain, 969–971
NR, see Noise reduction
Nuclear protection, 125
Nuclear radiation, 905
Nuclear radiation shielding, 905–906
Nuts, 256
Nylon fibers, in carpet flooring, 603
Object symbols, 146
Obsolescence, technological, 114
OCCS (Omniclass™ Construction Classification System), 146–148
Occupancy, lighting control and, 760
Occupancy hazard, 733
Occupational Safety and Health Administration (OSHA), 742
Off-center glazing, 449
Office furniture, 849–856
in conference rooms, 853–856
design considerations, 849–853
movable, 849–856
and office space dimensions, 853
Office parks, 138
Offset bearing, thresholds with, 461
Oil-based paint, 565
Oil-borne preservatives, 237
Oil interceptors, 669
Omniclass™ Construction Classification System (OCCS), 146–148
One-piece anchors, 255
One-piece shower stalls, 679
One-way slabs, 332
On-site runoff control measures, 926
Open classroom furniture, 866
Open-cut excavations, 931
Open-graded aggregate, 946
Openings:in concrete slabs and walls, 173
door, 348, 361, 385, 571
in exterior walls, 394–396
fire-resistance rated, 590
framing for, 347–349, 361–363
in metal roof decks, 350
in roofs, 516–522
in steel floor joists, 343
in structural panels, 385
Open mortise-and-tenon joints, 366
Open offices, 101–102
Open risers, 384
Open softlites, 246, 382
Open truck docks, 941, 942
Open valley flashing, 508
Open valley roofs, 475
Open web steel joists, 247, 342
Operable partitions, 545–546, 898
Operable parts, 44
Operating pressures, 662
Operating rooms (ORs), 809, 810
Operational infrastructure, 132–134
Operator casing, thresholds with, 461
Orchestra pits, 105
Organs, electronic, 827
Orientation, 74–75, 77–79
Oriented strand board (OSB), 957
ORs (operating rooms), 809, 810
OSHA (Occupational Safety and Health Administration), 742
Ottomans, 857
Outdoor air-relief air arrangement, 692
Outdoor lighting, 1001–1003
Outlets, 535
Outlet boxes, 540
Outtrigger, 376
Ovens, 800, 801, 819–820
Overflow outlets, 948
Overhangs, 375–376, 1028
Overhead-braced compartments, 621, 622
Overhead coiling doors, 583
Overhead poles, electrical, 1003
Overhead signs, 626, 627
Overheated climates, 88, 89, 282–283
Overlap carriers, 836
Overlays, panel product, 248

P
Packaged engine generators, 765–766
Packaged fountain equipment, 966–968
Packaged split systems, 719–721
Package receivers, 806
Pad-mounted transformers, 744, 1003
Paint booths, 888–889
Painting, 564–566
Panels, 868
access, 589–590
architectural, 401, 402
ballistic-resistant, 907
for concrete forming, 164
for cross-flow paint booth, 889
interior door, 581
plywood, 240–243, 246
for roof sheathing, 247
for subflooring, 246
for toilet compartment, 621
Panel absorption, 96
Panelboards, electrical, 752–753
Panel cores, 247–248
Paneling, wood, 546–547
Panelized wall cladding, 423–424
Panels:
acoustic, 609–610
in athletic rooms, 919
control, 52, 637, 638
curved glass block, 207, 542
drop, 165
exterior wall, 415, 419, 420, 424–427, 429, 431
foam core panel wall systems, 429, 430
on interior walls, 552–556
modular concrete panel vaults, 888
modular panel rooms, 904
rainscreen, 411–412, 423
structural, 384–386
Panel siding, 415
Panel strips, 550
Panel-supported systems, furniture for, 868–869
Pan forms, 166
Panic hardware, 589
Paper-faced metal gypsum board accessories, 557
Parallel bars, 831
Parallel curb ramp, 47
Parallel trusses, 377
Parapets:
curtain wall, 456, 457
drainage near, 505, 506
expansion joints at, 512–514
roofing at, 481
stone panels at, 418
Parking, accessible, 48–49
Parking lots, 942–945
Partial loading, on floors, 330
Partial penetration welds, 229, 231
Particleboard cores, 247–248, 579
Partitions. See also Interior partitions
acoustic, 99–101
operable, 545–546, 898
Partition clips, 612
Passenger cars, 938
Passenger elevators, 643, 648
Passenger loading zones, 48, 945
Passive cooling, 693
Passive measures, resilience-based design, 131–132
Passive soil pressure, 309, 310
Passive solar heating, 693
Pass-through kitchens, 66
Patching, concrete, 179
Patient care rooms, 807–808
Patient toilet rooms, 69–70
Patron aisles, restaurant, 874
Pavements, porous, 946–949, 995–997
Pavements, porous, 946–949
Pavers:
ballast, 511
interlocking, 951
light-traffic brick, 948
stone, 597–598, 952
Paver tiles, 596
Paving:
grass, 952
for pedestrian walks, 950–952
porous, 946–949, 995–997
tree and soil interactions under, 990
Peak, roof, 374, 381
Pedestal plumbing fixtures, 678
Pedestrian equipment, 783–785
revolving doors, 783–784
security gates, 785, 786
security turnstiles, 784–786
Pedestrian walks, 948, 950–952
Pedicure stations, 795
Penetrations, classical, 1015
Penetration, of wood preservatives, 237
Penetrations:
non-suspended ceiling, 611
nuclear radiation shielding, 905
roof, 491, 495, 502–504
for stacks, 701
X-ray radiation shielding, 902
Perforated metal, 225–227
Performance-rated panels, 241, 247
Performance theaters, 103–105, 821–824
Perimeter offices, 850
Perimeter sensor systems, 777
Permafrost, 88, 87
Permafrost climates, 86–87, 279–280
Permanent dewatering, 930
Permit, swimming pool, 908
Personalization, 22
Personnel name strips, 626
Pet grooming, 796
Phosphor bulb coatings, 758
Photovoltaic (PV) systems, 762–764
Physical attack, resistance to, 126
Pianos, 826
Picture moldings, 550
Piece material handling equipment, 657
Piers, exterior wall connections to, 398
Pier-and-panel garden walls, 977
Pier foundations, 976
Pilasters, 167, 202–203, 1012
Piles:
for deep foundations, 293–296
elevated buildings on, 87, 280
and grade beams, 287
replacing foundations with, 291
sheet, 931
Pile caps, 295
Pipe roller support, 302
Piping, 670–674
dampening around, 312
elevated water tank, 663
fittings for, 671
foundation drainage, 993
for fountains, 649, 648
insulation for, 673–674
joints in, 671–672
materials for, 670–671
metal, 221
for plumbing fixtures, 663
roof penetrations for, 502–504
sanitary waste, 664, 665
space requirements, 681
storm drainage, 682–683
subdrainage, 302, 993, 994
valves, 672–673
vent, 664–666
water supply, 661
Pitched chord trusses, 377, 378
Pitched trusses, 377, 378
Pittsburgh Children’s Museum (Pittsburgh, Pennsylvania), 19
Pitched trusses, 377, 378
Pittsburgh Children’s Museum (Pittsburgh, Pennsylvania), 19
Pit-type dock leveler, 780
Pivot hardware, 587
Plain bevels, 417
Plain-sliced veneers, 249
Plank gratings, 222
Plants, interior, 876
Planters, moveable, 875–876
Plantings, 984–986
rooftop, 991–992
shrub, 985–986
tree, 985, 988–991
Plaster:
ceilings, 613–614
frame spacing for, 528
as interior finish, 561–564
Plastic(s):
installation guidelines, 252–258
piping, 670–671
typical products, 244–245
Plates:
doors, 584
flat, 331
load, 300
metal, 214–215
top, 348, 361
wall, 375
Plate-type heat exchangers, 731
Platforms, pool, 916
Platform framing, 357–358
Platform lifts, 53–54
Platform (wheelchair) lifts, 651
Playing surfaces, 965
Play structures, 971
Plazas, tree planting on, 990
Plug valves, 673
Plug welds, 229–231
Plumbing, 659–690
accessibility, 660
compressed air systems, 688–690
design considerations for, 659–660
domestic water distribution, 660–661
fixtures, 674–682
fuel distribution utilities, 661–663
graywater systems, 685–688
penetrations of radiation shielded rooms for, 902
piping, 670–674
process support systems, 689–690
rainwater drainage, 682–685
sanitary waste systems, 663–670
sustainability, 660
for swimming pool, 909
Plumbing codes, 67, 660
Plumbing fixtures, 674–682
bathtubs and showers, 679–679
drinking fountains and water coolers, 681–682
fixture units, 674
hose bibbs and wall hydrants, 679
lavatories and sinks, 676–678
minimum hot water temperature for, 667
minimum operating pressures for, 662
piping for, 663
supports for, 680–681
traps for, 665
water closets, urinals, and bidets, 674–675
Plywood, 240–243
design data, 240–241
nuclear radiation shielding laminated to, 905–906
panel cores, 248
panel types, 241–243
sheathing for roofs and soffits, 246–247
siding, 414–415
subflooring, 245–246
Pneumatic control systems, 689
Pocket billiards, 828
Pocket doors, 448
Pocket wetlands, 929
Point-of-sale (POS) terminals, 785, 787
Point-of-use water heaters, 668
Point supports, 458
Point-support frameless skylight systems, 518
Point-to-point lighting, illuminance for, 757
Pole-through systems, 749
Pole construction, 367–368
Pole construction, 367–368
pollutants, 857
Pollution, light, 761
Polyester fibers, in carpet flooring, 603
Polymer-dispersed liquid crystal privacy glass, 568
Polypropylene fibers, in carpet flooring, 603
Polyurethane flooring, 606
Pommel horses, 830
Pond systems, 927
Pools:
decorative, 966
diving, 910–917
swimming, 705, 908–917
Pool lifts, 912
Pop-up spray assemblies, 983
Porosity absorption, 96
Porous paving systems, 946–949, 995–997
Porous turf, 947
Portable buildings, 878–879
Portable stage equipment, 825–826
Portals, paneled, 546–549
Portland cement, 600
Posts:
carrier, 361
heavy timber, 430
kingposts and queenposts, 378
for wood decks, 372, 373
Post and beam construction, 368–369, 371
Post-and-beam walls, ICF, 384
POS (point-of-sale) terminals, 785, 787
Post-event access, 134
Postframed edge, of countertops, 843
Post indicator valves, 1000
Post-mounted objects, 46
Post-tensioned concrete, 332–334
Post-tensioned slabs-on-grade, 301–302
Potable water distribution system, 661
Poured flooring, 605–606
Powers (mathematical data), 1021
Power and data filters, 905
Power generation, 762–765
Precast concrete:
beams, 203
decks and slabs, 336
exterior walls, 399–401
frame systems, 334–336
lintels, 200, 201, 203
retaining walls, 974–976
stone panel walls with, 420, 421
Precious metal interceptors, 669
Precipitation, annual, 315
Prefinished panel products, 248
Preliminary project descriptions, 148
Preparation areas, kitchen, 818
Preschools, 861
Presentation rooms, 814
Preservatives, wood, 238, 373
Preservatives, wood, 238, 373
Pressure-boosting systems, 662
Pressure-equalized walls, 392
Pressure-平等ized walls, 392
Pressure-gazed systems, 268
Pressure-grouting soil stabilization, 934
Pressure-plate mullions, 452
Pressure-treated wood, 237
Pressurization, HVAC system, 692
Pressurized water extinguishers, 743
Prestressed concrete, 332–334
Primary enclosures, animal, 918
Primary/secondary water distribution systems, 712
Primary stresses, long-span structure, 320
Primers, 564
Privacy glass, 568
Private areas, in schools, 861
Private patient rooms, 807
Procedural spaces, medical equipment for, 808–809
Process support systems, 689–690
Procurement documents, 160
Professional soccer fields, 960
Project descriptions, preliminary, 148
Projection screens, 774, 775, 810
Project manuals, 148–150
Projectors, 774
Proofers (retarders), 800, 801
Property lines, footings at, 286
Proscenium stages, 104
Protected membrane roofing, 492
Protection:
  branch circuit, 747
  for decorative glass, 262
  fall, 470
  for gutters, 505
  lighting, 766–767
  nuclear, 125
  radiation protection systems, 900–902
  radiological, 125
  slope, 924–925
  wall and door, 620–621
Protection board, 494
Protective coatings, concrete, 179, 180, 300, 301
Protruding objects, 45–46
Public pools, 910–913
  ADA pool lifts for, 912
  diving board dimensions, 913
  requirements and dimensions, 910–911
  with sloped entries, 912–913
  transfer areas, 913
Public restrooms:
  accessible, 67–72
  accessories for, 623
  for hotel guests, 70–72
  in museums, 71
  in restaurants, 70
  in schools, 71
  signage for, 626
Public telephones, 626
Pull stations, fire alarm, 742
Pumps:
  fire, 728–739
  of fountains, 967
  heat, 708, 719–721, 731
  sump, 670
  for swimming pools, 909
  vertical turbine, 967
  in water systems, 662
Pumping systems, fire-protection, 738–741
Purlins, 370, 382, 496
PVC roofing, 485
PV (photovoltaic) systems, 762–764
Pyramid framed skylight assembly, 519
Pythagorean theorem, 1021
Q
  Quality assurance, commissioning and, 696
  Quality mark, treated lumber, 238
  Quarter-sliced veneers, 249
  Queenposts, 378
R
  Rabbeted bevel, 417
  Raceway decking assemblies, 871
  Raceways, 871
  Racks:
    basket, 638–639
    basketball, 828
    battery, 764
  Rack ovens, 801
  Racquetball courts, 919, 920
  Radial walls, masonry, 201
  Radians, 1021
  Radiant cooling elements, 724
  Radiant heating elements, 723–724
  Radiation protection systems, 900–902
  Radii, masonry, 201, 207
  Radio frequency (RF) shielding, 902–905
  Radiographic rooms, 809
  Radiological protection, 125
  Radius minimums, glass block construction, 542, 543
  Radius pieces, stone, 423
  Radon, 279
  Rafter tails, 374
  Rafter tails, 374
  and cast roof decks, 386
    for glued-laminated construction, 381
    heavy timber, 430
  and skylights, 518
  for slate roofs, 476
  Rainwater drainage, 682–685
  Rainwater harvesting systems, 683–685
  Raised access floor systems, 751
  Raised curbs, 946
  Raised floor construction, 590–592
  Raised moldings, 547–548
  Rake moldings, 550
  Ramps:
    at access flooring, 592
    accessible, 49–51
    curb, 46–48, 51
    exterior, 953–954
    moving, 654–655
    wood decking for, 372
  Ramp stairs, 206
  Random matching, 249
  Ranges, kitchen, 800, 819
  Reach ranges, 43–44
  Reading rooms, 868
  Rear projection equipment, 814
  Receptacles, electrical, 748, 754
  Recessed floor mat systems, 607
  Reciprocating water chillers, 709
  Reclaimed wood, 236
  Recording instrumentation, for seismic activity, 899–900
  Recovery time, 110, 111
  Recreational equipment:
    athletic, 827–833
    instrumental, 826–827
  Recreation areas:
    baseball and softball, 955–957
    bocce, 962
    field and court construction, 965–966
    field hockey, 963
    football, 957–960
    lacrosse, 963
    rugby, 963
    sitework for, 955–966
    soccer, 960–962
    track and field, 964
  Recumbent bikes, 829
  Recyclable materials, 128
  Red cedar shakes and shingles, 471, 472
  Reduced wood framing, 363
  Redundancy, 110, 728
  Reed, Henry Hope, 1008
  Reference symbols, 146
  Reflection, law of, 1022
  Refraction, law of, 1022
  Refrigerant dehumidifiers, 727
  Refrigerant hot gas heat recovery, 731
Route accessibility, 44–46, 602
Row-to-row spacing (seating), 822
Rubber flooring, 604
Rubber roll-up doors, 467
Rubblestone stone wall patterns, 980
Rugby fields, 963
Rumford fireplaces, 632–634
Runs, of exterior stairs, 953
Runaround coils, 731
Rungs, ladder, 353
Runners, 529, 564, 613
Running match method, 249
Runoff, 985, 995, 996
Runoff control systems, 925–929
Rustication, 177, 190, 1016
S
Sabine, Wallace Clement, 96
Saddle hip roofs, 475
Saddle ridges, 474
Safes, 804–805
Safety: and building resilience, 115–121
fire, 120–121, 170, 637–638
and flooding hazards, 119–120
of gravitational and lateral loads, 115
life, 132–134
of playgrounds, 971
of rainwater harvesting systems, 685
and seismic forces, 118–119
shelters for, 116–117
and skylights, 517
in theaters, 823
and wind loads, 115–116
Safety cages, 353
Safety glass, 567
Sand, pavers in, 949
Sandblasting glass, 569
Sandboxes, 866
Sanded panels, plywood, 240, 241
Sand floors, ice rinks with, 921, 922
Sand interceptors, 669
Sandstone, 188
Sandwich wall construction, 399
Sanitary utility sewerage structures, 999
Sanitary waste systems, 663–670
and domestic water heaters, 666–668
drainage and waste lines in, 665
fixture traps for, 665
interceptors and separators, 668–670
sump pump systems, 670
vent piping for, 665–666
Saunas, 885–887
Sauna heaters, 887
Scale, of construction works, 148
Scarf joints, 549
School(s): acoustics in, 103
art rooms, 865
classroom design, 863–864
desks, 865
furniture for, 861–867
general classrooms, 861–863
open classroom furniture, 866
restrooms in, 71
tables, 865, 867
Scientific notation, 1021
SCMs (supplementary cementitious materials), 175–176
Scott, Geoffrey, 1009
Screeds, 562
Screens, 618, 755, 774, 810
Screws, 255, 256, 258, 412
Screw bulk material conveyors, 655
Screw spline storefront assemblies, 447
Scully, Vincent, 1008
Scuttles, roof, 521
Seals, 433, 546, 576
Sealants, 262
Sealant joints, 420
Sealers, concrete, 180
Seamless quartz flooring, 606
Seams:
canopy and awning, 523
metal roofing, 499–500
Seating:
at conference tables, 856
fixed, 845–849
movable, 857–858
in performance theaters, 822
for pool lifts, 912
in restaurants, 874–875
in schools, 865
Seating arrangements, 846, 847, 857
Seating capacity, 822
Seat walls, 979
Secant walls, 931
Secondary enclosures, animal, 918
Secondary stresses, long-span structure, 320
Secondary unit substations, 744, 745
Sectional doors, 464–466
Sectional sofas, 858
SectionFormat™, 147, 150–151
Security, 122–126
ballistic protection, 125–126
blast resistance, 122–124
chemical and biological agents, 124–125
cybersecurity, 126
forced entry/physical attack resistance, 126
and operational infrastructure, 132–134
radiological and nuclear protection, 125
and skylights, 517
Security auditing, 126
Security equipment, 784–786, 804–806
Security file cabinets, 874
Security glass, 261, 567
Security glazing, 542, 543
Security layering, 137
Security planning and design, 127
Security systems, 776–777
Seismic base isolation, 297–298
Seismic control, 899–900
Seismic design, 610, 612
Seismic forces, 118–119, 363
Seismic instrumentation programs, 899–900
Seismic joint covers, 318
Self-drilling expansion anchors, 255
Self-drilling fasteners, 258
Self-edge nosing, 943
Self-service checkout equipment, 787–788
Self-supporting membrane structures, 690
Semi-instantaneous water heaters, 668
Seminar-style classroom arrangements, 864
Semi-private patient rooms, 807
Sensors, 95, 776–777
Separators, sanitary waste, 668–670
Serlio, Sebastiano, 1007
Serpentine garden walls, 976
Serpentine marble, 552
Services, 642–777
communications, 767–777
conveying, 642–659
electrical, 744–767
fire protection, 732–743
HVAC, 691–731
intersections between, 132, 133
plumbing, 659–690
Service aisles, restaurant, 874
Service chases, 841, 842
Service walkways, rooftop, 511
Set screws, 258
Setting materials, tile, 596
Settlement, 283–284, 291
Seven-point dimension plans, 909–910
Sewers, 665
Shade, from landscaping, 985
<table>
<thead>
<tr>
<th>Index</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shades, window</td>
<td>836</td>
</tr>
<tr>
<td>Shading coefficient</td>
<td>263</td>
</tr>
<tr>
<td>Shading devices</td>
<td>437–438, 517</td>
</tr>
<tr>
<td>Shadowboxes</td>
<td>456</td>
</tr>
<tr>
<td>Shadow construction</td>
<td>76</td>
</tr>
<tr>
<td>Shaft walls</td>
<td>523–527</td>
</tr>
<tr>
<td>Shakes</td>
<td>431, 432, 471–472</td>
</tr>
<tr>
<td>Shake-on colors</td>
<td>178</td>
</tr>
<tr>
<td>Shallow air conditioning blades</td>
<td>437</td>
</tr>
<tr>
<td>Shallow foundations</td>
<td>285–289</td>
</tr>
<tr>
<td>Shallow marsh systems</td>
<td>927, 928</td>
</tr>
<tr>
<td>Shampoo stations</td>
<td>795</td>
</tr>
<tr>
<td>Shaping, metal</td>
<td>211–212</td>
</tr>
<tr>
<td>Shear block storefront assemblies</td>
<td>448</td>
</tr>
<tr>
<td>Shear loads</td>
<td>285</td>
</tr>
<tr>
<td>Shear-resisting control joints</td>
<td>975</td>
</tr>
<tr>
<td>Sheathing:</td>
<td></td>
</tr>
<tr>
<td>composite</td>
<td>244–245</td>
</tr>
<tr>
<td>plastic</td>
<td>244–245</td>
</tr>
<tr>
<td>plywood</td>
<td>246–247</td>
</tr>
<tr>
<td>rigid insulation</td>
<td>245</td>
</tr>
<tr>
<td>for roofs</td>
<td>244–247, 382, 472</td>
</tr>
<tr>
<td>for soffits</td>
<td>244–247</td>
</tr>
<tr>
<td>for walls</td>
<td>244–245, 431–432</td>
</tr>
<tr>
<td>She-bolt tie rods</td>
<td>169</td>
</tr>
<tr>
<td>Shed roofs</td>
<td>374</td>
</tr>
<tr>
<td>Sheet identification</td>
<td>143</td>
</tr>
<tr>
<td>Sheet metal</td>
<td>214–215, 227, 504</td>
</tr>
<tr>
<td>Sheet metal screws</td>
<td>258</td>
</tr>
<tr>
<td>Sheet piles</td>
<td>931</td>
</tr>
<tr>
<td>Sheet vinyl flooring</td>
<td>604</td>
</tr>
<tr>
<td>Sheet waterproofing</td>
<td>493</td>
</tr>
<tr>
<td>Shell angles</td>
<td>408</td>
</tr>
<tr>
<td>Shell (building)</td>
<td>314–525</td>
</tr>
<tr>
<td>Shelters, in buildings</td>
<td>116–117</td>
</tr>
<tr>
<td>Shelving</td>
<td>867, 868, 872–873</td>
</tr>
<tr>
<td>Shields, for wood, plastics, and composites</td>
<td>254–258</td>
</tr>
<tr>
<td>Shielding:</td>
<td></td>
</tr>
<tr>
<td>architectural</td>
<td>902</td>
</tr>
<tr>
<td>lead X-ray</td>
<td>900–902</td>
</tr>
<tr>
<td>nuclear radiation</td>
<td>905–906</td>
</tr>
<tr>
<td>radio frequency</td>
<td>902–905</td>
</tr>
<tr>
<td>Shielding effectiveness</td>
<td>902</td>
</tr>
<tr>
<td>Shingles</td>
<td>431, 432, 471–473</td>
</tr>
<tr>
<td>Shiplap siding</td>
<td>417</td>
</tr>
<tr>
<td>Shock absorber (valve)</td>
<td>673</td>
</tr>
<tr>
<td>Shop-fabricated cabinets</td>
<td>838–841</td>
</tr>
<tr>
<td>Shop-fabricated structural wood</td>
<td>364–365, 375–378</td>
</tr>
<tr>
<td>Shopping carts</td>
<td>788–789</td>
</tr>
<tr>
<td>Shored excavation</td>
<td>931–933</td>
</tr>
<tr>
<td>Shoring</td>
<td>291</td>
</tr>
<tr>
<td>Short-term resilience planning</td>
<td>139</td>
</tr>
<tr>
<td>Shouldered mortise-and-tenon joints</td>
<td>366</td>
</tr>
<tr>
<td>Showers</td>
<td>638–639, 679, 681</td>
</tr>
<tr>
<td>Shower compartments</td>
<td>61–62</td>
</tr>
<tr>
<td>Shower drains</td>
<td>666</td>
</tr>
<tr>
<td>Shrinkage:</td>
<td></td>
</tr>
<tr>
<td>concrete</td>
<td>170</td>
</tr>
<tr>
<td>of wood</td>
<td>234–236</td>
</tr>
<tr>
<td>Shutters, rolling</td>
<td>437, 438</td>
</tr>
<tr>
<td>Side boards</td>
<td>921</td>
</tr>
<tr>
<td>Side chairs</td>
<td>857</td>
</tr>
<tr>
<td>Side tables</td>
<td>858</td>
</tr>
<tr>
<td>Sidewalks</td>
<td>989</td>
</tr>
<tr>
<td>Sidewall-vented water heaters</td>
<td>702</td>
</tr>
<tr>
<td>Siding</td>
<td>414–418</td>
</tr>
<tr>
<td>plywood panels for</td>
<td>241</td>
</tr>
<tr>
<td>shakes and shingles for</td>
<td>431, 432</td>
</tr>
<tr>
<td>sliding joints in</td>
<td>235</td>
</tr>
<tr>
<td>Sight lines</td>
<td>812–813, 824</td>
</tr>
<tr>
<td>Signage</td>
<td>624–627, 945</td>
</tr>
<tr>
<td>Sign supports, rooftop</td>
<td>516</td>
</tr>
<tr>
<td>Sills:</td>
<td></td>
</tr>
<tr>
<td>curtain wall</td>
<td>455, 456</td>
</tr>
<tr>
<td>EIFS rainscreen walls at</td>
<td>413</td>
</tr>
<tr>
<td>heavy timber</td>
<td>429, 430</td>
</tr>
<tr>
<td>loading dock</td>
<td>780–781</td>
</tr>
<tr>
<td>in metal building systems</td>
<td>897</td>
</tr>
<tr>
<td>stone</td>
<td>191</td>
</tr>
<tr>
<td>stone spandrels at</td>
<td>419</td>
</tr>
<tr>
<td>for storefronts</td>
<td>450</td>
</tr>
<tr>
<td>structural panels and</td>
<td>386</td>
</tr>
<tr>
<td>window</td>
<td>444, 446</td>
</tr>
<tr>
<td>wood framing for</td>
<td>358–361</td>
</tr>
<tr>
<td>Simple beams</td>
<td>369, 1025–1026</td>
</tr>
<tr>
<td>Single-acting interior doors</td>
<td>578</td>
</tr>
<tr>
<td>Single-face fireplaces</td>
<td>629</td>
</tr>
<tr>
<td>Single-pitch framed skylight assembly</td>
<td>520</td>
</tr>
<tr>
<td>Single-user bathrooms</td>
<td>63</td>
</tr>
<tr>
<td>Single-user toilet rooms</td>
<td>60</td>
</tr>
<tr>
<td>Single-wythe masonry</td>
<td>403, 538</td>
</tr>
<tr>
<td>Single-zone air-handling units</td>
<td>718–719</td>
</tr>
<tr>
<td>Single-zone all-air systems</td>
<td>713</td>
</tr>
<tr>
<td>Sites:</td>
<td></td>
</tr>
<tr>
<td>commercial food service</td>
<td>799, 802, 803</td>
</tr>
<tr>
<td>plumbing for</td>
<td>676–678</td>
</tr>
<tr>
<td>residential kitchen</td>
<td>64, 818</td>
</tr>
<tr>
<td>Sisal fibers, in carpet flooring</td>
<td>603</td>
</tr>
<tr>
<td>Site-built formwork</td>
<td>165, 166</td>
</tr>
<tr>
<td>Site-built showers</td>
<td>679</td>
</tr>
<tr>
<td>Site development</td>
<td>966–981</td>
</tr>
<tr>
<td>fountains and decorative pools</td>
<td>966–971</td>
</tr>
<tr>
<td>playgrounds</td>
<td>971–972</td>
</tr>
<tr>
<td>retaining walls</td>
<td>972–981</td>
</tr>
<tr>
<td>Site improvements</td>
<td>928–942</td>
</tr>
<tr>
<td>throughlopes, 938</td>
<td></td>
</tr>
<tr>
<td>for truck docks</td>
<td>941–942</td>
</tr>
<tr>
<td>and truck/trailer sizes</td>
<td>939–941</td>
</tr>
<tr>
<td>and vehicle dimensions</td>
<td>938–939</td>
</tr>
<tr>
<td>Site security barriers</td>
<td>781–782</td>
</tr>
<tr>
<td>Sitework</td>
<td>924–1003</td>
</tr>
<tr>
<td>for athletic and recreational areas</td>
<td>955–966</td>
</tr>
<tr>
<td>basement excavation</td>
<td>931–936</td>
</tr>
<tr>
<td>civil utilities</td>
<td>993–995</td>
</tr>
<tr>
<td>development of site</td>
<td>966–981</td>
</tr>
<tr>
<td>earthwork</td>
<td>924–925</td>
</tr>
<tr>
<td>electrical utilities</td>
<td>1001–1003</td>
</tr>
<tr>
<td>exterior stairs and ramps</td>
<td>953–954</td>
</tr>
<tr>
<td>grading</td>
<td>936–937</td>
</tr>
<tr>
<td>improvements to site</td>
<td>938–942</td>
</tr>
<tr>
<td>landscaping</td>
<td>981–991</td>
</tr>
<tr>
<td>manholes, inlets, and catch basins</td>
<td>999–1000</td>
</tr>
<tr>
<td>parking lots</td>
<td>942–945</td>
</tr>
<tr>
<td>pedestrian paving</td>
<td>950–952</td>
</tr>
<tr>
<td>porous paving systems</td>
<td>946–949, 995–997</td>
</tr>
<tr>
<td>rooftop planting</td>
<td>991–999</td>
</tr>
<tr>
<td>runoff control systems</td>
<td>925–929</td>
</tr>
<tr>
<td>storm drainage grates</td>
<td>987–998</td>
</tr>
<tr>
<td>water management</td>
<td>930</td>
</tr>
<tr>
<td>Sting, 130–131, 631</td>
<td></td>
</tr>
<tr>
<td>6 North Building (St. Louis, Missouri), 34–38</td>
<td></td>
</tr>
<tr>
<td>Skincare rooms</td>
<td>796</td>
</tr>
<tr>
<td>Skip joists</td>
<td>332</td>
</tr>
<tr>
<td>Skylights</td>
<td>375, 376, 516–521</td>
</tr>
<tr>
<td>Slabs:</td>
<td></td>
</tr>
<tr>
<td>cantilevered</td>
<td>345</td>
</tr>
<tr>
<td>concrete</td>
<td>321–322, 326–338</td>
</tr>
<tr>
<td>concrete formwork for</td>
<td>166–167</td>
</tr>
<tr>
<td>connections of exterior walls and</td>
<td>393, 395</td>
</tr>
<tr>
<td>curtain walls at</td>
<td>456</td>
</tr>
<tr>
<td>filigree</td>
<td>337</td>
</tr>
<tr>
<td>heat transfer in</td>
<td>724</td>
</tr>
<tr>
<td>openings in concrete</td>
<td>173</td>
</tr>
<tr>
<td>post-tensioned, 301–302, 334</td>
<td></td>
</tr>
<tr>
<td>thresholds at</td>
<td>462</td>
</tr>
<tr>
<td>topping</td>
<td>724</td>
</tr>
<tr>
<td>walk-in cold storage room</td>
<td>883</td>
</tr>
<tr>
<td>working</td>
<td>494</td>
</tr>
<tr>
<td>Slab drainage</td>
<td>951</td>
</tr>
<tr>
<td>Slab-on-grade construction</td>
<td>87, 280, 301–302</td>
</tr>
<tr>
<td>Slats, door</td>
<td>581, 583</td>
</tr>
<tr>
<td>Slate</td>
<td>188, 474–476, 552</td>
</tr>
<tr>
<td>Sleep chairs</td>
<td>861</td>
</tr>
</tbody>
</table>
Stained glass, 567
Stainless steel, 214, 845
Stairs:
  concrete, 339
  exterior, 953, 954
  finishes for, 609
  fire, 645
  masonry, 205–206
  metal, 351–355
  in platform framing, 357
  stone, 600
  wood, 372
Stair climbers, 830
Stair hangers, 535
Stair rails, 350, 351
Stair soffits, 537
Stalls, parking, 943–944
Stand-alone (off-grid) systems, 762, 763
Standard foundations, 284
Standard foundations. See also specific organizations
  accessibility, 39, 40
  on computer room air-conditioning, 729
  defined, 39
  on electrical services, 744
  on fire protection, 732
  on floor loads, 330
  on HVAC systems, 691
  on metal stairs, 350
  on plumbing, 660
  on toilet and bathing rooms, 67, 68
  on wood, 234, 235, 238–239, 572
Standing seam roofing, 495–497, 500
Standpipes, 736, 738
Standing seam roofing, 495–497, 500
Standpipes, 736, 738
Standpipe-type roof washers, 684
Starkloff Disability Institute, 34
Starters, motor, 744–745
Starter strip, siding, 416, 417
Starting platforms, pool, 916
Static loads, 1025–1028
Staved lumber cores, door, 580
STC (Sound Transmission Class), 542
Steam baths, 887
Steel:
  AESS, 229, 341–342
  carbon, 215, 224
  columns for spread footings, 286
  concrete reinforcing with, 170–174
  filigree slabs on, 337
  lintels, 200
  portable buildings, 878–879
  sheets, coils, and plates, 214–215
  stainless, 214, 845
  supports for long-span curtain walls, 457
  taper ties, 168
  typical products made of, 216–222
  wrought, 224
  Steel angles (structural framing), 220, 516
  Steel baseplates, 369
  Steel beams, 358, 535
  Steel compression bases, 382
  Steel doors, 574–576
  Steel framing. See also Cold-formed steel framing
    brick veneers on studs, 406
    for CMU walls, 404
    as conductor, 766, 767
    stone panels on, 417–421
  Steel joists, 247, 342–344, 614
  Steel (CS) piping, 670
  Steel stud and lead-coated gypsum board construction, 901
  Steep slope roofs:
    characteristics and considerations with, 468
    collector arrays on, 707, 763
    covering, 471–477
  Steps, 372, 913, 979
  Step blades, 437
  Stepped footings, 164
  Stepped-pan-through-wall flashing, 506
  Steel curtain-wall construction, 452
  Stiffening braces, 612
  Stiles, rails and, 546, 580–581, 588
  Stirrup hooks and ties, 172
  Stone assemblies, 187–191
  joint and silt details, 190–191
  patterns and veneer, 189–190
  uses and properties, 187–189
  Stone ceilings, 617
  Stone countertops, 845
  Stone facing finishing, 552
  Stone flooring, 597–601
  Stone hedges, 980
  Stone reservoirs, 997
  Stone retaining walls, 972
  Stone veneer, 189–190, 566, 617
  Stone wall panels, 552–556
  stone walls, 420, 422, 972, 979–981
  stools, in restaurants and bars, 849
  Stops:
    door, 585
    glass, 581
    gravel, 512
    interior door, 571, 576
    in storefront systems, 449
    wood trim, 550
  Storage, 65, 546, 688, 865
  Storage-type water heaters, 667, 668
  Storefronts, 447–450, 544
  Storm drainage systems, 994–995, 999
  design considerations for, 994–995
  grates, 997–998
  grates for, 997–998
  piping, 682–683
  Storm-resistant blades, louvre, 436
  Stormwater wetlands, 927–929
  Story drift, 118
  Stoves, accessible, 65
  Stove bolts, 256
  Straight flange expansion joints, 512
  Strap anchors, 555
  Strap footings, 285
  Streambanks, 925
  Street furniture, 133
  Street ramps, 953–954
  Strengthened glass, 260, 566
  Stressing tendons, 170, 172
  Stress (echo) treatment rooms, 808
  Stretched ceiling systems, 610–611
  Stretch-in installation, of carpet flooring, 603
  Stringerless systems, 591
  Stringers, 352, 384, 591–592
  Structural chemical grouting, 292
  Structural design and analysis tools (BIM), 157, 158
  Structural facing tile, 183–184
  Structural framing, 216–223
  angles, 220
  channels, 218–220
  for clay masonry exterior walls, 405
  gratings, 222–223
  shapes of, 216–218
  in superstructures, 340–344
  tees, 218–219
  tubing and pipes, 221–222
  zebs, 220
  Structural glass, 261
  Structural integrity, 127
  Structural panels, composite, 384–386
  Structural performance, 439, 611
  Structural roof sheathing, 244
  Structural silicone glazing, 268, 269
  Structural steel, architecturally exposed, 229, 341–342
  Structural wall sheathing, 244
  Structural welds, 228–231
  Structure-borne sound isolation, 898–899
  Stucco, 413–414
  Student learning spaces, 863
  Stud-to-track connections, metal framing, 348
  Sturd-I-Floor, 241, 245, 247
  Subdivisions, 138
  Subdrainage, 302–303, 947–948
  Subfloors, 245–246, 595, 723
Subfloors, 245–246, 595, 723
Subhearth air frames, 631
Submerged depth, 912–913
Submersible sump pumps, 670
Submittals, 160
Substations, 744, 745
Substitution requests, 160
Substrate, waterproofing, 493
Substructure, 274–312
basements, 304–312
cast-in-place concrete slabs, 298–303
crawl spaces, 303–304
foundations, 283–298
soils, 274–283
Subsurface drainage systems, 993–994
Sumped glass, 569
Sump pans, recessed, 350
Sump pump systems, 670
Superposition, 1014
Superstructure, 329–387
composite components, 373, 384–387
concrete components, 330–340
floor loads, 330, 331
roof framing, 374–382
structural metal components, 340–355
structural use comparison of systems, 329–330
wood components, 356–369, 371–373, 382–384
Supplementary cementitious materials (SCMs), 175–176
Supports:
collector array, 706
collector, 435
equipment, 514–516
for excavations, 933–936
guardrail, 345
masonry fireplace, 631
pipe roller, 502
piping, 674
plumbing fixture, 680
point, 458
sign, 516
space frame, 893
Support spaces, audio-visual, 814–816
Surcharged foundations, 296
Surcharged soil loading, 309, 310
Surface cooking work area, kitchen, 817
Surface drainage systems, 994–995
Surface-mounted corner guards, 621
Surface-mounted counterflashing, 511
Surface-mounted door closers, 584, 588
Surface runoff values, 995
Surface textures, interior window, 569
Surfacing:
built-up bituminous roofing, 478–479
concrete work, 174–180
Surge reduction devices, 967
Surgical suites, 809, 810
Surveillance, natural, 136–138
Suspended ceilings, 609–610, 613
Suspended floors, 724
Suspended forms, 168
Suspended precast panel anchorage, 400
Suspension systems, ceiling, 610, 611, 614–617
Sustainability, 110
in building resiliency, 128–130
and building shell, 320–321
and electrical services, 744
and electrical services, 744
and heating, 320
and HVAC systems, 691
and plumbing, 660
Sustainable products, specifications for, 151
Swimming pool(s), 908–917
competition, 913–917
courts, 910–913
and heating, 320
solar heating systems for, 705
Swing-away lecture seating, 865
Swimming pools, 908–917
competition, 913–917
public, 910–913
Sustainable products, specifications for, 151
Tabling:
in conference rooms, 855–856
in lounges, 858
in restaurants, 874, 875
in schools, 865, 867
Table tennis, 832–833
Table tennis, equipment for, 832–833
Tackl, 56, 82, 827
table, 168
Task lighting, 745
Task method, 757
T-bar grating, 506
Technical criteria, 42–77
building blocks, 42–44
communications features, 56–57
curbs, 46–48
doors, 54–56
elevators, 51–52
kitchens, 63–66
parking, 48–49
public restrooms, 67–72
ramps, 49–51
routes, 44–46
toilet and bathing rooms, 57–63
wheelchair lifts, 53–54
Technological obsolescence, 114
Tee decks, 336
Tees, structural metal, 218–219
Telecommunications rooms, 768
Telecommunications systems, 766, 768–771
Telephones, 56–57
Teller and service equipment, 806
Temperature:
and air vents in saunas, 886
and heating, 320
bitumen, 478
color, 94
hot water, 667, 668
Tempered glass, 630
Tenants, in resilience-based design, 130
Tensile structures, 890, 892
tension, 730
Tension cable trusses, 457
tension lap splices, 173
terminals, 74
Terminal control units, 712
Terminal reheat air distribution, 713–714
terminals, 712
Termitite shields, 217
Terrazzo floor finishes, 601, 602
Territorial reinforcement, 136–138
Testing, adjusting and balancing (TAB), HVAC system, 693–694
Testing, of deep foundations, 296
Textile wall coverings, 564
test symbols, 146
text symbols, 146
Text telephones (TTYs), 56–57
textured concrete, 177–178
textured glass, 568
theatre and stage equipment, 821–826
design of performance theaters, 821–826
portable, 825–826
stage curtains, 825
Theater collectors, solar, 703–704
Theater comfort, 90–92
Theater continuity, 439
Theater cooling load, 729, 755
Theater expansion, 1022
Theater forces, 78
Theater glazing, 450
Theater impact, 74
Theater insulation, 312
Theater mass, 90
Theater movement, of building shell, 316–319
Thermal performance:
of flooring, 592
of glass block, 186
of windows, 439
of window treatments, 836
Thermal resistance, 263
Thermal wheels, 730
Thermoplastic polyolefin (TPO) membrane roofing, 485–490, 503–504
Thin brick veneer, 183
Thinset beds, 555
Thoroughfares, 938
Threaded joints, 671
Threading screws, 258
Three-compartment sinks, 802
Three-tab shingles, 473
Thresholds, 461–463, 591, 595, 599–600
Throats, masonry fireplace, 631
Through-the-wall gas-heating units, 697
Ticket windows, 806
Tiebacks, excavation, 934
Tie-hole treatments, 179
Tie rods, 169
Ties, formwork, 164–165, 168–170
Ties, wire, 614
Tiles:
acoustic ceiling, 611–612
carpet, 602, 604
cast, 611
distilled, 611
paver, 596
quarry, 596
roof, 473–477
Spanish, 473
stone, 597–598
structural facing, 183–184
vinyl, 604
water-felted, 611
Tile flooring, 596–598
Tilting braising pan (tilting skillet, tilting frying pan), 800
Tilt-up concrete, 165, 392–398
Timber retaining walls, 673
Timber shoring, 931
Time:
recovery, 110, 111
reverberation, 105
solar, 78–79
Time zones, 78
Tin, 210
Tinted glass, 260, 261, 567
Title blocks, 143
TL (sound transmission loss), 97
Toddlers, 6, 69
Toe clearances, 42, 838
toggle bolts, 257
Toilet(s), 57–59, 680. See also Water closets
Toilet compartments, 621–622
Toilet rooms:
accessibility of, 59–60, 67–70
children’s, 68–69
healthcare in-patient room, 69
patient, 69–70
public, 67–70
single-user, 60
Tongue-and-groove ceilings, 382
Tongue-and-groove siding, 417
Top-hung operable panel partitions, 545
Top-mounted air terminals, 766
Topographic maps, 936
Topping slabs, heat transfer in, 724
Top plates, 348, 361
top rails, 619
Total internal reflection, 1022
Touch-sanded panels, plywood, 240
TPO (thermoplastic polyolefin) membrane roofing, 485–490, 503–504
Track, for sectional doors, 466
Track and field events, 964
Track splices, metal framing, 348
Traction elevators, 643, 646–647, 649
Traditional checkout equipment, 785, 787
Traditional checkout equipment, 785, 787
Traditional fireplaces, 629, 630, 632–633
Traffic:
carpet, 603
elevator, 650
Traffic controllers, 783
Traffic flow, in kitchens, 819
Training, in security planning and design, 127
Transaction equipment, 806
Transfer boxes, 902
Transfer platforms, 913
Transfer steps, 913
Transformers, 744, 1003
Transitions, floor, 599–600, 607–609
Transition flashing, 508–509
Translucent linear glazing system, 568
Traps, 664, 665
Trap arms, 665
Trapezoidal footings, 285
Trash chutes, 659
Trash production, daily, 659
Travel distances, elevator, 642
Travertine, 552
Treadmills, 830
Tread
ladder, 353
stairs, 350, 953
Treated wood, 236–239, 307–308, 373
Trench boxes, 902
travelling, 1002
in urban areas, 988–991
and veneer characteristics, 250, 251
Tree guards, 990
Trenches, 932–933, 986
Trench box, 933
Trench drains, 998, 999
Trench gratings, 750
Trench header ducts, 750
True hinge anchorages, 380
True north, 77–78
Trusses:
and cast roof decks, 386
exterior wood truss walls, 430
metal, 349
shop-fabricated, 365, 376–378
tension cable, 457
Tsien, Billie, 22
T-type retaining walls, 974
Tub containing walls, 674
Tubing, metal, 221–222
Tufted carpets, 601
Turf, porous, 947
Turnbuckles, 257
Turning radius, 940
Turning space, wheelchair, 43
Turnstiles, security, 784–786
Tusk and soffit tenon joints, 366
TV armoires, 859
T-wall junctions, 166
25-meter and 25-yard competition pools, 915–916
Two-pipe, dual temperature system, 718
Two-pipe ground-coupled water loop heat pump, 720–721
Two-sided structural glazing, 454
Two-stage sealant joints, 399
Two-way slabs, 332

UL (Underwriters Laboratory), 907
Ultraclear glass, 260
Unbonded single-strain tendon anchorage, 334
Undercarpet electrical power cables, 871
Underground duct banks, 1003
Underground utility lines, 987
Underground vaults, electrical, 1003
Underheated climates, 87–88, 281–282
Underlayment:
  heat transfer through, 723
  nailing schedule for, 245–246
  resilient, 698
  wood flooring over, 594
  Underpinnings, foundation, 285–289
  Underslab, 311, 993
  Understanding, in universal design, 20
  Understructures, access flooring, 591
  Underwriters Laboratory (UL), 907
Uneven bars, 830
UniFormat™, 147–149
Uniform background lighting, 757
Uniform Drawing System, modules, 142
Unintended consequences, 132, 135
Uninterruptable power supply (UPS), 764–765
Uneven bars, 830

Valves, piping, 672–673
Vans, 938
Van-accessible stalls, 945
Vapor barriers, for windows, 439
Vapor retarders:
  for condensing furnaces, 703
  for gas furnaces, 635–636
  for gas-fired heaters, 702
  Vertical clearance, reduced, 46
  Vertical enclosures, see Exterior vertical enclosures
  Vertical file cabinets, 873
  Vertical ladders, 353
  Vertical storm drainage piping, 683
  Vertical turbine pumps, 967
  Vibration control, 898–899
  Vibratory bulk material conveyors, 665
  Video-conferencing, 810, 814, 815
  Video systems, 774
  Video teleconferencing, 775
  Viewing angle, 103–104
  Viewing area, 811–812

Vents:
  B-, 634
  fire and smoke, 522
  masonry, 197
  rooftop, 521–522
  sauna, 886
  Vent stacks, 700–701
Ventilation.

Viewing angle, 103–104
Viewing area, 811–812

Vibration control, 898–899
Vibratory bulk material conveyors, 665
Video-conferencing, 810, 814, 815
Video systems, 774
Video teleconferencing, 775
Viewing angle, 103–104
Viewing area, 811–812
Vinyl flooring, 604
Vinyl pool liners, 910

Vapor barriers, for windows, 439
Vapor retarders:
  for condensing furnaces, 703
  for gas appliances, 635–636
  for gas-fired heaters, 702
  Vertical clearance, reduced, 46
  Vertical enclosures, see Exterior vertical enclosures
  Vertical file cabinets, 873
  Vertical ladders, 353
  Vertical storm drainage piping, 683
  Vertical turbine pumps, 967
  Vibration control, 898–899
  Vibratory bulk material conveyors, 665
  Video-conferencing, 810, 814, 815
  Video systems, 774
  Video teleconferencing, 775

Vents:
  B-, 634
  fire and smoke, 522
  masonry, 197
  rooftop, 521–522
  sauna, 886
  Vent stacks, 700–701
Ventilation.

Viewing angle, 103–104
Viewing area, 811–812

Vibration control, 898–899
Vibratory bulk material conveyors, 665
Video-conferencing, 810, 814, 815
Video systems, 774
Video teleconferencing, 775
Viewing angle, 103–104
Viewing area, 811–812
Vinyl flooring, 604
Vinyl pool liners, 910
Vinyl tile flooring, 604
Vinyl wall coverings, 564
Visible light, 93
Visual alarms, 776
Visually symmetrical trees, 989
Visual programming interface, BIM, 158
Vitruvius, 1007–1009
Voice-over-Internet protocol, 769
Void forms, 176
Volume:
architectural, 1023–1024
calculating, 1023–1024
soil, 988–989
thermal expansion of, 1022
Vitruvius, 1007–1009
Voice-over-Internet protocol, 769
Void forms, 176
Volume:
architectural, 1023–1024
calculating, 1023–1024
soil, 988–989
thermal expansion of, 1022
Volutes, classical, 1012
Waffle slabs, 332
Wainscot, 547, 621
Waist-height turnstiles, 785, 786
Waiting times, lobby, 646
Waitstaff stations, 802, 847
Walks:
moving, 653–655
pedestrian, 948, 950–952
Walk-in cold storage, 883
Walking surfaces, 45–46
Walk-off grilles, 606–607
Walkways, 372, 511
Walls. See also Exterior walls; Interior partitions; Rainscreen walls; Retaining walls
access panels in, 589, 590
ballistic-resistant, 907
barrier, 783
basement, 304–308
blast window support for, 124
braced, 933
cavity, 445–446
cheek, 205
cavity, 445–446
crack, 205
control joints in, 559
curtain, 267, 447–450, 458
drained cavity, 318, 392, 514
drain, 998
drainage, 88, 89, 281–283
efficiency, 88, 89, 281–283
expansion joints at roof intersections with, 512–514
flash, 19
foundation, 287–289, 931, 932
framing doors in, 577
framing intersections of, 349, 361, 362
grid, 384
head, 808, 998
knee, 308
of metal building systems, 896–897
openings in concrete, 173
pool, 910
post-and-beam, 384
protection for, 620–621
radial, 201
retaining, 972–981
sauna, 886
seat, 979
seam, 931
seam, 931
sheathing for, 244–245
and skylights, 520
slurry diaphragm foundation, 931, 932
sound of, 884
steam baths, 887
stone, 979–981
at storefronts, 448
transfer, 913
underpinning, 290–291
vault, 888
for windows, 439
Wall anchors, 255
Wall base, 604–605
Wall brackets, guardrail, 619
Wall cladding, 423–427
Wall connections, systems furniture, 871
Wall cross sections, 564–566
Wall forms, 164–167
Wall guards, 620–621
Wall-hung cabinets, 838
Wall-hung lavatories, 676–677
Wall-hung sinks, 676–677
Wall hydrants, 679
Wall mounted fire department connection, 737
Wall panels, 375
Wall plugs, metal, 198
Wall sections, structural facing tile for, 183–184
Wall sheet ground, 905
Warm air furnaces, 711, 712
Warnings, detectable, 56, 627
Warning signage, 624
Warranties, for roofing, 470, 471
Washers, 256, 797, 821
Wash sinks, 678
Water:
leakage of, through walls, 439
in mortar and grout, 192
movement across joints of, 392
temperature of hot, 667, 668
Water absorption, 551, 596
Water-based dyes, 178
Water-based fire-suppression systems, 732
Waterborne preservatives, 237
Water chillers, 708–709, 730
Water closets, 58–59, 674–675, 680–681
Water conservation, 984
Water coolers, 681–682
Water distribution, 669–671
Water distribution systems, 712
Water-felted (wet-felted) tiles, 611
Water conservation, 984
Water heaters, 666–668, 702
Waterjet cutting, 570
Water loop heat pumps, 720–721, 731
Water management, 436, 518, 930
Water meters, 666
Water play environments, 19
Waterproofing:
for basement walls, 310–311
for horizontal roofs, 493–495
at roof transitions, 511
Water quality, 683, 969
Water repellants, 429
Watershed concept, for expansion joints, 496
Waterstops, formwork with, 168
Water tanks, elevated, 662, 663, 1000
Waterlight doors, 466
Water treatment, 689–685, 688, 909
Water vapor, 432–434, 469
Wattage, electrical devices, 747
Weather barriers (water-resistant barriers): in EIFS systems, 428
for roofs, 468, 469, 472
for stucco, 413
Weathering indexes, 182
Weathering probability map, 284
Weatherproofing, 443
Weatherstripping, 462–463
Web members, roof framing, 349
Web stiffeners, 343
Weepholes, 197
Weight, of materials, 1022–1023
Weightlifting, equipment for, 833
Welded joints, 225, 341, 401, 672
Welded wire fabric reinforcing, 170
Wells, 303, 930
Wellness, in universal design, 20
Wellpoints, 930
Western (platform) framing, 357–358
Wet/dry glazing systems, 732
Wet glazing, 268
Wetlands, 925–929
Wet seals, 426
Wheelchairs, seating arrangements for persons using, 846
Wheelchair lifts, 53–54, 651
Wheelchair lift vans, 939
Wheelchair turning space, 43
Whirlpool bathtubs, 678
Williams, Tod, 22
Wind forces, 78, 363, 470, 984
Wind loads, 115–116
Windows:
  acoustic, 898
  ballistic-resistant, 908
  blast, 123, 124
  blast effects on, 906
  cashier, 806
  in classical architecture, 1015
  EIFS rainscreen wall around, 412–413
  exterior, 438–459
  heat loss through, 264
  interior, 566–570
  interior trim, 549
  metal framing for, 347
  in precast concrete walls, 400
  radiation shielding, 902
  radio frequency shielding for, 904
  sound control, 101
  stone spandrels for, 419
  in structural panels, 385
  ticket, 806
  wood framing for, 362
  Window treatments, 836–837
  Window units, manufactured, 264–269, 441
  Winter garden atrium, 94
Wood:
  characteristics of, 234–236
  classification of, 236
  for exterior walls, 429–432
  heavy timber construction, 365–366, 382
  installation guidelines, 252–258
  as interior finish, 546–550
  permeance of, 433
  pole construction, 367–368
  post and beam construction, 368–369
  practices involving, 234–236
  roofing materials, 471–472
  shop-fabricated structural, 364–365
  sleeper floor system, 308
  sources of, 236
  standards on, 234, 235
  stone flooring over, 598
  superstructure components, 356–369, 371–373, 382–384
  treatments for, 236–239
  typical products, 245–251
  window detailing in, 444
  Wood adhesives, 252
  Wood blocking, 198
  Wood ceilings, 612–613
  Wood construction, 234, 901
  Wood decking, 371–373
  Wood doors, 465, 572–574
  Wood fiber panels, 415
  Wood flooring, 593–596
  Wood frame construction, 234
  Wood framing:
    for basement walls, 307–308
    for floors, 356–361
    for interior doors in, 573
    for interior partitions, 528–533
    for louvers with, 435
    for openings, 361–363
    for plywood subflooring on, 245–246
    reduced, 363
    residential electrical wiring in, 748
    for roofs, 374–378, 382
    stone panels on, 554
    veneers on, 408, 409
    for windows, 362
  Wood guardrails, 619
  Wood screws, 255, 258
  Wood trim, 540–550
  Wood trusses, 430
  Wood veneers, 248–251
    on countertops, 643
    cuts for, 249
    grades for, 240
    matching options for, 249–251
    on panel products, 248–249
    species characteristics, 250, 251
    as wall coverings, 564
  Woodwork, architectural, 548–549
  Wool fibers, in carpet flooring, 603
  Working slabs, horizontal waterproofing, 494
  Workstations, 749–752, 869
  Worktables, commercial kitchen, 799
  Work triangle, kitchen, 818–819
  Woven carpets, 602
  Wraparound frames, 575
  Wrestling, equipment for, 833
  Wrought iron, 224
  Wrought steel, 224
  W steel shapes, 216, 218, 219
X
  X-ray scanning equipment, 805–806
  X-ray shielding, 900–902
Y
  Youths, anthropometric data for, 7–13. See also Children

Z
  Zamboni ice resurfacers, 832
  Z-clips, 535
  Zees, 220
  Zinc, 210
  Zone junction boxes, 749
  Zoning, HVAC, 691–692