

Index

Note to the Reader: Throughout this index **boldfaced** page numbers indicate primary discussions of a topic. *Italicized* page numbers indicate illustrations.

A

- Absolute keynote paths, 506
- accelerators, **78–79**, 78
- AccuRender library, 420, 420
- AccuRender option, 90
- AccuRender rendering. *See* rendering
- Acquire Coordinates option, 233, 536
- activating
 - Project Browser views, **39**, 39
 - worksets, 619, 619
- active planes, 161
- Add Link dialog, 535–536, 536
- Add Parameter option, 489–490
- Add to Design Option Set dialog, 262–263, 263
- Add to Group tool, 521
- additive selection, 62
- Advanced Model Graphics dialog
 - sun and shadows, 398–399, 398
 - sun studies, 456–457, 457, 459
 - sunlight, 416
 - true-color shading, 410
- AEC (Architecture, Engineering, Construction)
 - world, 3, 11
- Align tool, 148, 149
- aligned dimensions, 96
- aligning
 - elements, **72–73**, 72–73, 148, 149
 - fill patterns, 92, 92
 - sketch lines to reference planes, 221–222
- Always Vertical parameter, **292**, 292
- analytical drawings, **395–399**, 396–399
- angles
 - elevation tags, 113
 - extrusions, 337, 337
 - fill patterns, 92–93
 - joins, 387, 387
 - railings, 382, 383
 - reference lines, 159, 159
 - revolves, 178–180, 178–179
 - roof slope, 342, 346
 - rotation, 67, 69
 - segments, 189, 189
 - shadows, 399
 - sun, 397–398, 416–417, 458
 - sweeps, 185, 186
 - units, 142, 146
 - void shapes, 223
- angular dimensions, 96
- animation
 - sun studies, **458–460**, 459–460, **462**, 462
 - walkthroughs, **423–424**, 424
- annotations, 471
 - 3D detail, **585–586**, 586
 - callouts 109, 109
 - crop regions, 571
 - keynotes. *See* keynotes
 - material definitions, 84
 - object categories, 17
 - revision clouds, 604, 605
 - rooms. *See* rooms
 - schedule keys, **481–484**, 482–484
 - separation lines, **475–476**, 475–476
 - shared parameters. *See* shared parameters
 - tags. *See* tags
 - text, **502–503**
 - views, **471**, 471
 - visibility, 444
- appearance
 - materials, **90**
 - schedules, 124, 440, 448, 448
- Apply Nosing Profile option, 137
- Apply View Template option, 150
- architecture
 - history, 1–2
 - sustainability in, **451–452**

Architecture, Engineering, Construction (AEC)

- world, 3, 11
- archiving with DWGs, 610
- Area Boundary tool, 432, 435
- area plans
 - area calculations, **430–432**, 430–432
 - vs. room areas, 479
- area schedules, 438
- areas
 - adding, **436–437**, 436–437
 - calculating, **429–433**, 429–432
 - rooms, **478–480**, 479–481
 - settings, **145**, 146
- arrays
 - creating, **304–305**, 304–305
 - elements, **70–71**, 70–71
 - in Family Editor, **297**, 297
 - formulas for, **300–301**, 301–302
- Arrow Angle setting, 113
- arrowheads
 - keynotes, 510
 - leaders, 100
- articulation, wall, **315–318**, 315–318
- artificial lighting, 417, 453
- Associate Family Parameter dialog box, 306
- associations
 - arrays, 71
 - bidirectional, 22
 - shutter width, 300
- asymmetric slopes on gable roofs, 346, 346
- At Library Locations method, 506
- Attach Detail tool, 521
- attached detail groups, 516, 524–525, 524
- auditing files, **642**, 642
- auditorium railings, 392
- auto-hiding sections, **53**
- Autodesk Design Review. *See* Design Review
- Autodesk User Group International (AUGI), 645
- automated dimensioning, 148, 148
- automating area calculations, 433
- axes for revolves, 178, 178, 180, 181
- axonometric 3D views, **56**

B

- background
 - rendering, **419**, 419
 - text, 100, 100
- balusters
 - main patterns, **383–385**, 383–385
 - placement, 381–383, 382
 - railings, 379, 379
 - per tread on stairs, **385–387**, 386–387
- barrel roofs, 336, 336, 338, 370, 370
- Base blend setting, 190
- Base Level property, 334
- base molding, **571–572**, 572
- Base Offset From Level property, 334
- Basics tab
 - design bar, 51, 272
 - rooms, 472
 - text, 502
- Begin with a Riser setting, 137
- Beginning setting for baluster patterns, 384, 385
- behavior of keynotes, **504–505**
- bidirectional associations, 22
- bidirectional relationships, **19–22**, 20–22
- BIM. *See* Building Information Modeling (BIM)
- binding links, 533, 538, 539
- black and white high-contrast effects, **400**, 400
- blends, **190–191**, 190–191
 - examples, **197**, 197
 - for lamp, **194–196**, 194–196
 - troubleshooting, **192**, 193–194
 - vertices, **191**, 192
- blocks, 19
- Bold setting, 101
- BOMA (Building Owners and Managers Association) area calculations, 430
- Boolean joins, 251
- borrowing elements, **629**
- Bottom view range for floor plans, 41, 42
- boundary lines, 432, 432
- bounding boxes, 480, 480
- Break Symbol in Plan setting, 136, 137
- Broken Section Display Style setting, 103, 103
- broken section lines, **52**, 52
- building area schedule updates, 443

Building Information Modeling (BIM), 1

- advantages, **1–4**
- for creativity, **4, 5**
- documents, **7, 8**
- Family Editor, **8, 8**
- interaction, **6**
- layers and X-References, **9**
- as new technology, **10**
- problem-solving designs, **7, 7**
- as process change, **9–10**
- properties, **6, 6**
- working with, **10–11, 11**
- Building Maker tools, **207**
 - advantages, **238**
 - design verification, **239–243, 240–244**
 - Floor Area, **239, 240**
- Building Owners and Managers Association (BOMA) area calculations, **430**
- By Category tag option, **485, 488**
- By Date, Time, and Place sun angle setting, **398, 458**
- By Host railings option, **389**
- By Keynote numbering option, **506**
- By Project revision numbering option, **602**
- By shared coordinates option, **233, 536**
- By Sheet option
 - keynote numbering, **506**
 - revision numbering, **602**
- By Type railings option, **389, 389**

C

- CAD files and formats
 - details, **545–547, 546–547**
 - exploding, **636**
 - linking, **543–545, 544**
- calculated fields, **447, 447**
- calculations
 - areas, **429–433, 429–432**
 - room volume, **636, 636**
 - stairs, **135, 136**
- Callout tool, **559**
- callouts and callout tags
 - custom, **108–112, 109–112**
 - elevation, **114**
 - working with, **556–557, 556–557**
- cameras
 - 3D views, **56, 57, 413**
 - sun studies, **454–456, 455–456**
- carbon footprints, **451**
- Cascade option, **31**
- Cast Shadows option, **457**
- categories, **13–15, 14–15**
 - annotation, **17**
 - imported, **18, 18**
 - Model Object, **15–17, 15–16**
 - for shared parameters, **495–497, 495–496**
- CDs (Construction Documents), **6**
- ceilings
 - floor connections and details, **573–574, 573–574**
 - plans, **42, 42**
 - types, **134–135**
- Center setting, **384, 385**
- Center-to-center option, **232, 536**
- Centerline Pattern option, **98**
- Centerline Symbol option, **98**
- Centerline Tick Mark option, **99**
- central files, **617**
 - saving, **621**
 - workflows, **625–626, 626**
 - working on, **623**
 - in worksharing, **618, 618**
- CFDs (computational fluid dynamics), **467**
- chain selection, **62**
- chairs
 - arrays, **304–305, 304–305**
 - nesting, **303, 303**
 - visibility, **306–307, 306–307**
- Change Sweep Return option, **322**
- change tracking, **601**
 - Design Review. *See* Design Review
 - parametric modeling and supplemental drawings, **607**
 - revisions, **601–607, 601–607**
- classification system, **14**
- Close Hidden Windows option, **31, 636**
- closed loops
 - blends, **197, 197**
 - profiles, **283, 283**
 - revolves, **179–180, 179–180**
 - sketches, **156, 156**
 - sweeps, **185**

- closing unused DWGs, 636
- coarse settings
 - Scale Fill parameter, 407
 - wall detail, 132
- color
 - dimensions, 99
 - elevation tags, 113
 - elevations, 410, 410
 - fill schemes, 151, 402–405, 403–405
 - legends, 403
 - level tags, 115
 - lines, 85
 - text, 100
- color-coded plans and sections, 401–402, 402
 - fill schemes, 402–405, 403–405
 - presentation plans, 405–408, 406–407
 - sections, 405, 405–406
- combining revisions, 603
- commas (,) in type-catalog syntax, 141
- common edges, 143–145, 144
- communication with teams, 643
- complex roofs, 199, 199
- compound walls, 315, 315
- computational fluid dynamics (CFDs), 467
- conceptual design and early studies, 229, 230
 - 3D context building, 233, 234–235
 - Building Maker tools
 - advantages, 238
 - design verification, 239–243, 240–244
 - Floor Area, 239, 240
 - building mass and underlying mass relationships, 256, 256–257
 - imported geometry. *See* imported files and geometry
 - massing best practices, 244–246, 245
 - curtain systems by face, 249
 - design options, 237
 - Floor by Face tool, 246–247, 247–248
 - roofs by face, 249
 - scheduling, 249–251, 250–252
 - Wall by Face tool, 246
 - program check and feasibility, 235–236, 236
 - site data and context, 230–233, 231–232
- conditional visibility, 296, 297
- cone roofs, 368, 368
- constraints
 - design stage, 22, 23
 - move, 66, 75, 76
 - in performance, 641
- Construction Document set, 289
- Construction Documents (CDs), 6
- context, building, 230–233, 231–232
- converting groups into links, 533, 533–534
- copies in performance, 637
- Copy tool, 67
- copying
 - area boundaries, 436, 436
 - color, 404, 406
 - with Copy, 67
 - groups, 526
 - with Move, 66
 - options, 63–64, 63
 - sweeps, 186
 - system families, 24, 25
- cores, walls, 309–311, 310–311
- Corner Radius option, 108
- corruption, file, 642–643, 642–643
- cost estimates, 446–448, 447–448
- cost schedules, 272, 272
- Create Floors tool, 246
- Create Instance group option, 526
- Create Mass tool, 207, 212, 233, 253
- Create Roof tool, 255
- Create View Template From View option, 35, 35
- creativity, 4, 5
- crop regions
 - annotations, 571
 - perspective views, 58, 59
- cupolas, 180, 181
- Current View copying option, 64
- Current View Only option, 545
- Curtain Grid tool, 327
- Curtain Grid Line tool, 330
- curtain panel families, 290, 290
- curtain systems
 - by face, 249
 - with Rhino, 255–256
- curtain walls, 325–326, 325–326
 - designing, 326–329, 327–329
 - doors and windows, 330, 331
 - panels, 330, 331

- custom 3D content, **279**
 - encoding design rules, **298–302**, 299–302
 - families
 - building, **303–307**, 303–307
 - categories and parameters, **291–293**, 291–292
 - curtain panel, **290**, 290
 - detail component, **289**, 289
 - face-based, **287**, 287
 - generic, **289**
 - host-based, **282–283**, 282
 - line-based, **285–286**, 286–287
 - linking parameters, **295–296**, 295–297
 - modeling, **279–280**, 279
 - nesting, **292–295**, 293–295
 - profile, **283–285**, 283–285
 - RPC, **288**, 288–289, 292
 - template selection, **280**, 280–281
 - types, **280**
 - work plane-based, **288**
 - parametric arrays, **297**, 297
 - custom keynotes, **120**, 120–121
 - custom line types, **551**, 552
 - custom patterns, **92–95**, 92, 95, 389
 - custom tags, **101–103**, 102, **116–119**, 116–119, **606–607**, 607
 - custom templates, **81–84**, 82
 - custom title blocks, **121–125**, 121–125
 - custom walls, **128–129**, 129
 - default wrapping, **131–132**, 132
 - layers, **129–131**, 130–131
 - preview window, **129**
 - Cut Geometry tool, 209–210, 210
 - cut graphics, 16, 16
 - Cut Line Styles, 143
 - Cut Pattern option, 90
 - Cut Plan Profile tool, 169, 169, 337, 337
 - Cut planes, **41–44**, 43–44
 - Cutoff Level property, 334
 - Cutoff Offset property, 334
 - cylinder mass elements, 214, 214
- D**
- datum planes, 160, 160
 - defaults
 - element settings, **147–151**
 - graphics settings, 145
 - keynote text files, 505
 - view templates, 150
 - wall wrapping, **131–132**, 132
 - Work Planes, **166–170**, 166–170
 - Defines Slope option, 333–334
 - Delete Dedicated Options Views dialog, 267, 267
 - Delete Inner Segment option, 74
 - deleting
 - dimension types, 99
 - markups, 615
 - materials, 88
 - tags, 473, 473
 - text type, 101
 - unused DWGs and views, 636
 - Deny/Retract option, 631
 - dependent views, 17
 - depth
 - blends, 190
 - elevations for, **408–412**, 408–412
 - extrusions, 175
 - view, **44–46**, 44–46
 - Design bar, 30, 31
 - for massing creation, 209, 209
 - Rendering tab, **416–419**
 - tools, **32–33**, 32
 - design cycle, **453**
 - design options, **259–260**, 259
 - design-option sets, **260–261**, 261
 - displaying, **264–266**, 265–266
 - editing, **262**, 263
 - elements for, **261–264**, 262–263
 - enabling, **260**
 - in practice, **268–271**, 268–271
 - quantities and cost schedules, **272**, 272
 - rooms, **272–275**, 273–275
 - selecting, **266–267**, 267
 - Design Review, **607**, **609**
 - importing markups, **614–615**, 614
 - interface, **609–610**, 609–610
 - model markup in, **613**, 613–614
 - publishing to, **610–612**, 611–613
 - design rules, encoding, **298–302**, 299–302
 - Designer role, 645
 - designing curtain walls, **326–329**, 327–329
 - detail groups, 516, **531–532**, 532, **547–548**

- details and detail components, 15–16, 15, 541
 - 3D, 581
 - annotations, 585–586, 586
 - creating, 581–586, 582–586
 - callouts, 556–557, 556–557, 559
 - creating, 548
 - drafting views, 541–542, 542
 - embedding within families, 586–590, 587–590
 - exporting, 594–595, 595–596
 - families, 289
 - groups, 524, 524
 - importing and linking, 542–547, 543–544, 546–547
 - importing views, 595–597, 596–597
 - information for, 557–559, 558–559
 - keynotes, 509, 509
 - line tools. *See* line tools
 - for line types, 551, 552
 - nesting, 576, 576–577
 - properties, 550–551, 551
 - repeating, 548–551, 549–552, 575, 575
 - rotating, 551
 - shaft opening, 598, 598
 - symbolic lines for, 592–594, 592–594
 - tips, 578
 - visibility settings, 591–592, 591–592
 - wall sections
 - model details, 566–578, 567–578
 - SIM condition, 560–566, 560–566
- .dgn files, 544
- Dimension tool, 217, 390
- dimensions
 - defaults, 148, 148
 - in family details, 588, 588
 - formulas for, 299–300, 299–300
 - in moving elements, 65–66, 65
 - styles, 96–99, 96–99
 - in views, 471
- Direct Editing tool, 373
- directions in Reference Planes, 177, 177
- Directly sun angle setting, 398
- Disallow Join option, 313, 313
- Disassociate option, 165
- disjoining
 - hosted elements, 66
 - walls, 313, 313
- displaying design options, 264–266, 265–266
- Dist. from Previous setting, 384
- documentation. *See* annotations
- Documenter role, 645
- documents, 7, 8
- dome roofs, 180, 181, 337, 338, 369, 369
- Door category, 46
- door knobs, 182, 182
- doors
 - curtain wall, 330, 331
 - defaults, 148
 - host-based families, 282, 282
 - in modeling principles, 171, 171
 - rotating, 68, 68
 - symbolic lines for, 594, 594
 - tags, 472, 486–488, 488
 - custom, 117–119, 117–119
 - shared parameters for, 497–501, 498–501
 - types, 135
- dormers, hipped roofs with, 359, 359–360, 362, 362–364, 366, 366–367
- drafting lines
 - for elevations, 409
 - reusing, 567, 567
- drafting patterns, 90–91
- Drafting tab
 - keynotes, 504, 506
 - tags, 485–487, 485
 - text, 502
- drafting views, 541–542, 542
- drainage points, 374
- Draw Points tool, 373
- Draw Split Lines tool, 373–374, 374
- drawing list schedules, 438
- Duplicate option
 - groups, 526
 - materials, 88
- Dutch gables, 355, 355–358, 357
- DWF files, 607
 - archiving, 610
 - in performance, 641
 - sharing, 609
- DWG files
 - importing and linking, 230–233, 231–232, 544
 - in performance, 637
 - with SketchUp, 252

.dxf files, 544

Dynamic View dialog, 58, 58, 413, 413

E

edges

common, 143–145, 144

silhouette, 414, 414–415

Edit Assembly dialog

floors and roofs, 134, 134

split sections, 318, 318

sweeps and reveals, 319

wall cores, 309, 310

wall tools, 315, 316

walls, 128–129, 129, 132

Edit Baluster Placement dialog, 381–383, 382

Edit Base blend setting, 190

Edit Color Scheme dialog, 403, 403

Edit Joins tool, 388, 388

Edit option

extrusions, 175

groups, 526

Edit Rails dialog, 381, 381

Edit Roof Structure dialog, 375, 375

Edit Shared Parameters dialog, 492–495, 492–494, 496

Edit Top blend setting, 190

Edit Wall Joins tool, 312, 312

Edit Work Plane option, 165, 175–176, 176–177

editable worksets, 620, 620

editing

actions for, 61

aligning, 72–73, 72–73

arraying, 70–71, 70–71

constraints, 75, 76

copying and pasting, 63–64, 63

joins, 76, 77

keyboard shortcuts, 78–79, 78

moving, 64–67, 65–67

offsetting, 74, 75

painting, 76, 77–78

pinning, 75

Place Similar, 64

resizing, 71–72, 72

rotating and mirroring, 67–70, 68–70

selecting, 61–63, 61–62

splitting, 74, 74, 76, 77–78

trimming and extending lines and walls, 73–74, 73–74

blend vertices, 191, 192

design options, 262, 263

groups, 531, 531

keynotes, 504–505

materials, 88–90, 89, 420, 421

schedules, 448–449, 448–449

sketches, 157

wall joins, 312, 312

Work Planes, 165

Editing Requests dialog box, 631–632, 631–632

electrical lighting, 417, 453

Element Properties dialog, 6, 6

callout tags, 111

cost schedules, 272

door tags, 118

elevation tags, 114

Height Offset From Level parameter, 243, 243

revision clouds, 604, 605

scope boxes, 161, 161

section tags, 108

stairs, 135–136, 136

system families, 24

templates, 150, 150

text, 100

visibility, 306

wall wrapping, 319

walls, 128

worksets, 623–624, 623–624

elements

aligning, 72–73, 72–73

arraying, 70–71, 70–71

borrowing, 629

for design options, 261–264, 262–263

for keynotes, 119, 504, 511–512, 512

moving, 64–67, 65–67

ownership, 628–632, 628–632

pinning, 75

resizing, 71–72, 72

rotating and mirroring, 67–70, 68–70

tagging, 472

elevations, 408, 408

default settings, 149, 149

images in, 411–412, 412

Linework tool, 408–409, 408–409

- Project Browser views, **53–56**, 54–55
- tags for, **112–115**, 112–114
- transparent materials, **411**, 411
- true-color, **410**, 410
- embedding details within families, **586–590**, 587–590
- Empty glazing setting, 370
- enabling
 - design options, **260**
 - design rules, **298–302**, 299–302
 - shadows, **397–398**, 398
- End setting for baluster patterns, 384, 385
- End angle resolve setting, 178, 178
- End with a Riser setting, 137
- energy analysis, **466–468**, 467–469
- Entire Walls option, 148
- Environment dialog, 419, 419
- Exclude feature, 528
- Exclude Options option, 263
- Explain Error tool, 477, 477
- exploding imported CAD files, **636**
- exporting, **424**, 425
 - details, **594–595**, 595–596
 - to gbXML, **467–468**, 468
 - sun studies, **461**, 461
 - sun views, 459
- expressive drawings, shadows for, 395, 396, **399–401**, 400–401
- Extend Below Base setting, 136
- extending
 - datum planes, 160
 - lines and walls, **73–74**, 74
- extending pergola, gable roofs with, 351, 351
- exterior skins, **265**, 265
- external text files, 504
- extruded roof dormers, hipped roofs with, 366, 366–367
- Extrusion end setting, 175
- Extrusion start setting, 174, 175
- extrusions
 - roofs by, **166–170**, 166–170, **336–337**, 336–337
 - working with, **174–177**, 174–177

F

- face-based families, **287**, 287
- faces with extrusions, 176
- families and Family Editor, **8**, **8**, **13–15**, 14, **23**
 - 3D. *See* custom 3D content
 - vs. blocks, 19
 - callout tags, 108–111, 111
 - ceilings, **134–135**
 - for custom title blocks, **122–125**, 122–125
 - door tags, 498
 - doors and windows, **135**
 - elevation tags, 114
 - embedding details within, **586–590**, 587–590
 - floors and roofs, **133–134**, 134
 - in-place, **27–28**, 28
 - loadable, 171, 171
 - managing, 101
 - mass placement, 212
 - parametric mass family creation, 215, 218, 219
 - for primary forms, 174, 174
 - profiles, 319
 - Project Browser views, **38**, 39
 - section view tags, **104–107**, 106
 - stairs, **135–139**, 135–139
 - standard, **25–27**, 25–27
 - system, **23–24**, 24–25
 - templates, **280**, 280–281
 - types. *See* types and type catalogs
 - visibility settings, 284, 284, 591–593, 591–593
 - wall wrapping, 319, 319
 - walls, 131
 - worksets, 620
- Family Category and Parameters dialog, 291, 291
- Family Creator role, 645
- Family Types dialog
 - arrays, 304, 304
 - dimensions, 299–300, 300
 - parametric mass family creation, 218, 219
 - RPC, 288, 288, 292
 - visibility, 306
- FAR (Floor Area Ratio), 235
- feasibility, program, 205, 205, **235–236**, 236
- feet units, 146
- fences. *See* railings
- Field of View tab, 58, 58
- Fields tab, 440, 440, 447, 482

- File Locations tab, 82, 82
 - File Save Options dialog, 626, 626
 - filenaming conventions, keynotes, 505
 - files
 - corruption, 642–643, 642–643
 - linking, 535–536, 536
 - workflow, 626–627, 626
 - Fill Available Space modes, 551
 - Filled Region tool, 405, 553–554, 553–554
 - fills and fill patterns
 - color, 115, 402–405, 403–405
 - custom title blocks, 123
 - for details, 573–574, 573–574
 - elevation tags, 113
 - graphics, 407, 407
 - materials, 90–95, 91–93, 95
 - regions, 553–554, 553–554
 - filtering
 - keynotes, 507, 508
 - schedules, 440, 442, 442
 - selections, 62, 62
 - Fine level of detail, 132
 - First end blend setting, 190
 - Fixed Distance modes, 551
 - Fixed Number modes, 551
 - Flat railing option, 389
 - flat roofs, 345, 345
 - flexing models, 218
 - flip controls, 68, 69
 - Flip Orientation option, 254
 - Flipped Dimension Line Extension option, 98
 - Floor Area tool, 239, 240
 - Floor Area Faces tool, 239, 246
 - Floor Area Ratio (FAR), 235
 - Floor by Face tool, 242, 246–247, 247–248
 - Floor Edit tools, 246
 - floor plans, 40, 41
 - Cut planes, 41–44, 43–44
 - primary range, 43–44, 43–44
 - View Depth, 44–46, 44–46
 - View Range, 40–42, 41–42
 - floors
 - bidirectional relationships, 20–21
 - ceiling connections and details, 573–574, 573–574
 - in modeling principles, 170–171
 - sketch-based design, 154–157, 155–156
 - types, 133–134, 134
 - Font setting, 136
 - footprint roofs, 332–335, 332–336
 - force units, 142
 - formats
 - CAD, 543–547, 544, 546–547
 - exporting to, 424, 425
 - formatting schedules, 440–441, 441, 447, 449, 449
 - formulas
 - arrays, 300–301, 301–302
 - dimensions, 299–300, 299–300
 - Foundation model, 427–428
 - area calculations, 429–433, 429–432
 - areas and tags, 436–437, 436–437
 - change tracking, 608, 608
 - rentable area plans, 433–435, 433–435
 - schedules. *See* schedules
 - worksets, 621–623, 622–623
 - four-sided gable roofs, 364, 364–365
 - freestanding elements
 - railings, 378, 378
 - rotating, 68
 - Function column for wall layers, 130
 - Furniture category, 46
 - Furniture System category, 46
- ## G
- gable roofs, 350, 350
 - with asymmetric slopes, 346, 346
 - Dutch gable with glazed roofs, 355, 355–356
 - Dutch gables, 357, 357–358
 - with extending pergola, 351, 351
 - four-sided, 364, 364–365
 - hip and gable, 352, 352–353
 - gambrel roofs, 353, 353–354
 - gbXML, 467–468, 468
 - generic 3D families, 289
 - Generic Models category, 15
 - Generic template, 119
 - glazed panels, 326
 - Global Project Settings, 145
 - globally unique identifiers (GUIDs), 501
 - Go to View dialog, 163, 163, 561, 561
 - granting permissions, 630–632, 631–632

graphic appearance

- consistency settings
 - dimension styles, **96–99**, 96–99
 - Fill Patterns, **90–95**, 91–93, 95
 - Line Patterns, **87–88**, 87–88
 - Line Styles, **85–86**, 86
 - Materials Editor, **88–90**, 89
 - Object Styles, **84–85**, 85
 - text, **100–101**, 100–101
- markups, 613–615
- schedules, **448–449**, 448–449

graphic overrides, **143–145**, 143–144, 407, 407

graphical selection, **476–477**, 477–478

graphics cards, 637, 637

Green Building Studio service, **468**, 469

Green Building xml, **467–468**, 468

grids, **160–161**, 160

- curtain walls, 325, 325–326, 328, 328
- tags, **116**
- Work Planes, 164, 164

Grids worksets, 619

gross area

- calculations, 430
- floors, 241–242, 241
- plans, **431–432**, 431–432

gross building schedules, 438

Group Edit mode, 520–521, 520, 522

Group Edit toolbar, 521

Group Editor, 520

Group Properties dialog, 521

groups, **516**

- adding rooms to, **521–522**, 522
- arrays, 70–71, 71
- best practices for, **532–533**
- creating and managing, **517**
- detail, **531–532**, 532, **547–548**
- detail elements for, **524**, 524
- editing, **531**, 531
- vs. links, **538–539**, 539
- moving elements in, **530–531**, 530
- nesting, **523–525**, 523–525, 529
- parameters, **493–494**, 493–494
- as parts of projects, **529**, 530
- Project Browser views, **39**
- repeating, **516–521**, 516–521, **528–529**, 529
- variations, **525–528**, 526–528

GUIDs (globally unique identifiers), 501

H

half hipped roofs, **360–362**, 360–362

hatch patterns, **90–95**, 91–93, 95

head graphics in section tags, **107–108**, 107–108

heads, callout, 109, 110

Height setting for cylinder mass elements, 214, 214

Height Offset At Head setting, 343

Height Offset From Level setting, 243, 243

Help menu, 645

hiding

- markups, 615
- sections, **53–54**, 54

high-contrast black and white effects, **400**, 400

hip and gable hybrid roofs, 352, 352–353

hipped roofs, 348–349, 348–349

- with extruded roof dormers, 366, 366–367
- half, **360–362**, 360–362
- with sloped arrow dormers, 359, 359–360
- with two dormers, 362, 362–364

historical data, 468

History dialog box, 627

history of design and documentation, **1–2**

Horizontal tag orientation, 487

host-based elements, 263

host-based families, **282–283**, 282

Host Layer Line Styles dialog box, 143–145, 144

host objects in graphic overrides, **143–145**, 143–144

Host Sweep tool, 322

I

identical buildings on shared sites, **535**

Identity Data property, 479

Identity tab, 90, 491

IES <Virtual Environment> application, **467**, 467

Image Mapping dialog, 421, 421–422

images in elevation views, **411–412**, 412

Imperial library, 508

imperial units, 146

Import Instance Query dialog, 547, 547

imported files and geometry

- categories and subcategories for, **18**, 18
- exploding, **636**
- Inventor for, **256**
- limitations, 18
- in performance, 637

positioning, **232–233**
 Rhino for, **255–256**, 255–256
 SketchUp for, **252–254**, 253–254

importing
 3D conceptual models, **224–225**, 224
 Design Review markups, **614–615**, 614
 details, **542–547**, 543–544, 546–547, 588, 589
 DWG/DGN site information, **230–233**,
 231–232
 patterns, **94–95**, 95
 with SketchUp, 253, 253
 views, 537, **595–597**, 596–597

in-place families, **27–28**, 28, 171, 172
 in-place roofs, **337–338**, 338
 in-place walls, **324**, 324
 inches units, 146
 infill wall types, 326
 information for details, **557–559**, 558–559
 Insert 2D Elements dialog, 597, 597
 Inside detail option, 551
 instance parameters, **19**
 Insulation Bulge to Width Ratio setting, 552
 Insulation tool, **552**, 553
 intensities, sun, 399, 399
 interaction, **6**
 interface. *See* user interface
 interior lights, **417–418**, 418
 Interior Tick Mark option, 99
 Interiors workset, 621
 Inventor software, **256**
 invisible lines, 118
 Is Reference parameter, 216
 issuing revisions, 602–603
 Italic setting, 101

J

jogged sections, **52**, 52
 Join Geometry tool, **76**, 77, 210, 249
 joins, **76**, 77
 masses, 210, 211–212, 249–251, 250–251
 walls, **312**, 312

K

Keep Readable option, 92, 92
 keyboard shortcuts, **78–79**, 78

Keyboard.txt file, 79
 Keynote command, 504
 keynote legend schedules, 439
 Keynote Text style, 509
 keynotes, **119–120**, 120–121, **503–504**, 503
 behavior and editing, **504–505**
 elements for, **511–512**, 512
 family, **508–512**, 508–511
 filenaming conventions, **505**
 legends, 439, **507**, 507–508
 predefining, **512–513**, 512–513
 schedules, **508**
 settings, **147**, 147
 in views, 471, **506**, 506
 wall sections, **509–510**, 509–511
 keys, schedule, **481–484**, 482–484
 Kooolhaas, Rem, 534, 535

L

labels
 custom title blocks, 123
 keynotes, 120
 section view tags, **104**
 shared parameters, 500

lamp, **194–196**, 194–196
 lampshade, 197, 197
 Landing Carriage Height setting, 139
 Landing Overlap setting, 136
 landings, **387**, 387
 layer joins cleanup, **311–312**, 312
 layers, **9**
 custom walls, **129–131**, 130–131
 importing and linking, 545
 merging, 318, 318
 overrides, 143–145, 144
 position, **132**, 132
 splitting, **317–318**, 317–318

Layout modes, 551
 LCR (Lot Coverage Ratio), 235
 Le Corbusier, 2
 Leader Arrowhead setting, 100
 leader lines, 607, 607
 Leadership in Environmental and Energy Design
 (LEED) system, 452, 465
 legends, keynotes, 439, **507**, 507–508

- length
 - keynotes, 120
 - lines, 98
 - nosing, 137
 - units, 142, 146
 - Level tool, 239
 - levels, **159–160**
 - bidirectional relationships, 20–21, 21
 - default settings, 149
 - floor plans, 40, 40
 - rooms, 478
 - tags, **115, 115**
 - levels of detail
 - families, 586
 - in performance, **638–639**
 - walls, **132, 133**
 - Libeskind, Daniel, 3, 3
 - libraries
 - keynotes, 508
 - materials, 420, 420
 - organizing, **26–27, 26–27**
 - lifecycle costs, 203
 - lighting, **416–418, 417–418**
 - lighting fixtures, 282, 282
 - Limit Offset property, 478
 - line-based families, **285–286, 286–287**
 - line patterns
 - creating, **87–88, 87–88**
 - elevation tags, 113
 - level tags, 115
 - line tools
 - custom title blocks, 122
 - Filled Region, **553–554, 553–554**
 - Insulation, **552, 553**
 - Linework, **408–409, 408–409, 555–556, 556**
 - Show Hidden Lines, **554–555, 554–555**
 - linear arrays, 70
 - lines
 - boundary, 432, 432
 - invisible, 118
 - offsetting, 74, 75
 - repeating details for, **551, 552**
 - separation, **475–476, 475–476**
 - splitting, 74, 74
 - styles, **85–86, 86, 143**
 - symbolic, **592–594, 592–594**
 - trimming and extending, **73–74**
 - lineweights, 85, 86
 - dimensions, 98
 - elevation tags, 113
 - level tags, 115
 - text, 100
 - links and linking, **533, 533–534**
 - common uses, **534–535, 535**
 - details, **542, 543**
 - CAD details, **545–547, 546–547**
 - CAD formats, **543–545, 544**
 - files, **535–536, 536**
 - vs. groups, **538–539, 539**
 - markups, 614
 - parameters, **295–296, 295–297**
 - Project Browser views, **38**
 - special features, **536–537**
 - unloading and reloading, 537
 - visibility, **537–538, 538**
 - live connections, links for, 543
 - Load from Library dialog box, 26, 26
 - loadable family types, 171, 171
 - loaded profiles for sweeps, 185
 - loading
 - group files, 525, 525
 - mass families, 212, 213
 - shared work, **628**
 - tags, **485**
 - from type catalogs, **142, 143**
 - local files
 - in performance, 637
 - in workflows, **626–627, 626**
 - Lockable Door parameter, 500
 - loops
 - blends, 197, 197
 - profiles, 283, 283
 - revolves, 179–180, 179–180
 - sketches, 156, 156
 - sweeps, 185
 - Lot Coverage Ratio (LCR), 235
- ## M
- M_Generic Tag.rtf template, 119
 - M-Miscellaneous Wide Flange-Column.rfa family, 141
 - Main Model, 260–264, 266

- Make Elements Editable option, 628, 628
- Make Workset Editable option, 619
- Manage Links dialog, 543, 544
- Manage Place and Locations dialog, 397, 397, 458
- manual dimensioning, 148
- Map tab, 421, 421
- markups
 - Design Review for, 613, 613–614
 - importing, 614–615, 614
- masking regions, 548, 549
- Mass.rft template, 213
- Mass Element.rft template, 213, 215
- massing and massing studies, 201–203, 201–203
 - 3D contexts, 233
 - best practices, 244–246, 245
 - curtain systems by face, 249
 - design options, 237
 - Floor by Face tool, 246–247, 247–248
 - roofs by face, 249
 - scheduling, 249–251, 250–252
 - Wall by Face tool, 246
 - Design bar, 32
 - Floor Area tool, 239
 - importing 3D conceptual models, 224–225, 224
 - mass creation, 208–210, 209–212
 - mass element creation, 207–208, 207–208
 - mass family creation, 213–214, 214
 - mass family placement, 212–213, 212–213
 - mass joining, 249–251, 250–251
 - mass scheduling, 224
 - mass tags, 223
 - parametric mass family example, 215–223, 215–223
 - primary forms, 173–174, 174
 - rapid prototyping and 3D printing services, 225–226, 225–226
 - tools, 206–208, 206–208
 - uses, 204–205, 204–206
 - workflows, 172, 173, 203–204
- Match option for groups, 526
- Match Properties option, 63
- Material column for wall layers, 130
- Material Editor, 420–421, 421
- Material Library dialog, 420
- material takeoff schedules, 438
- materials
 - editing, 88–90, 89, 420, 421
 - fills, 90–95, 91–93, 95
 - keynotes, 119, 504, 509–510, 509–511, 512
 - non-image based, 422, 422
 - parameters, 491, 491
 - rendering, 419–422, 420–422
 - stairs, 137
 - tags, 486
 - texture maps for, 420–421, 421–422
 - tracking, 463–464, 464–465
 - for types, 140
 - wall finish, 316–318, 316–318
- Maximize Extents option, 160
- Maximum Riser Height setting, 137
- Maximum Segment Angle setting, 189, 189
- Maximum Spacing modes, 551
- mechanical, engineering, and plumbing (MEP)
 - consultants, 451
- Medium level of detail, 132
- Membrane Layer option, 130
- merging layers, 318, 318
- metal decks, 575–576, 575–576
- Metric library, 508
- Metric Mass.rft template, 215
- metric units, 146
- Middle Stringers setting, 138
- Minimum Tread Depth setting, 137
- Mirror tool, 70, 70
- mirroring elements, 67–70, 68–70
- mistakes in worksharing, 629
- Miter joins, 312, 312
- model groups, 516
- Model Object categories, 15–17, 15–16
- model patterns, 90–91
- Modeling design bar, 171, 171
- modeling principles, 153–154, 154
 - blends, 190–197, 190–197
 - extrusions, 174–177, 174–177
 - overview, 170–174, 171–174
 - revolves, 178–182, 178–183
 - sketch-based design, 154
 - floors, 154–157, 155–156
 - Work Planes, 157–162. *See also* Work Planes
 - solids and voids, 198–199, 198–199
 - sweeps, 183–189, 184–189

Modeling tab, 173, 174
 models
 3D physical, 202–203, 202
 details, 566–578, 567–578
 importing, 224–225, 224
 objects, 84, 85
 rapid prototyping, 225–226, 225–226
 Modify Sub Elements tool, 373
 Modify Vertical Structure options, 319
 Monolithic Stair setting, 136
 More Tools flyout, 33, 33
 Move To 2nd option, 70, 70
 Move tool, 66, 66
 moving elements, 64
 in groups, 529–531, 530
 with nearby elements, 67, 67
 nudging, 66, 66
 with temporary dimensions, 65–66, 65
 between worksets, 623–625, 624–625
 mullions, 325, 326, 328, 328–329
 Multi-Category tags, 485
 Multi-Day sun settings, 457, 459–460, 460, 462, 462
 multicategory schedules, 438
 multipitch roofs, 371, 371–372
 Multiple Alignment option, 72
 multiple buildings on shared site plans, 534–535, 535
 Multiple Copy or Array command, 239
 multiple massing design options, 237, 237–238
 muntins, 299, 299

N

names
 callout tags, 111, 111
 dimension types, 99
 door tags, 499–500, 499–500
 elevation tags, 113–114
 line patterns, 87
 materials, 88
 section tags, 107
 text type, 101
 Work Planes, 162
 natural daylight, 453
 navigator pane, 610
 Nearby Elements feature, 67, 67

nesting
 chairs, 303, 303
 detail components, 576, 576–577
 families, 214, 292–295, 293–295
 groups, 523–525, 523–525, 529
 links, 537
 New dialog
 door tags, 498
 parametric mass family creation, 215
 New Area Plan dialog, 431, 431
 New Drafting View dialog, 542, 542, 546, 546
 New Pattern dialog, 91, 93–95, 93, 95
 New Schedule dialog, 438, 440, 481, 482–483
 No Edge option, 145
 non-image based materials, 422, 422
 non-linear sections, 103
 nonstraight segments, 375
 Nosing Length setting, 137
 Nosing Profile setting, 137
 note block schedules, 439
 notes
 keynotes. *See* keynotes
 text, 119–120, 120–121
 nudging elements, 66
 numbering
 keynotes, 506
 revisions, 602
 NURBS shape, 224, 224
 NURBS surfaces, 255–256, 255–256

O

Object Styles dialog, 14, 14
 Annotation Objects tab, 17, 101, 102
 floor plans, 40
 for graphic consistency, 84–85, 85
 graphics rules, 143, 144
 Imported Objects tab, 18, 18
 Model Object tab, 15–16
 revision clouds, 604, 605
 standard families, 25
 offsets
 Floor by Face tool, 247, 248
 lines and walls, 74, 75
 opaque filled regions, 553, 553

- Open dialog
 - auditing files, 642
 - libraries, 27, 27
 - Open Stringer Offset setting, 139
 - optimizing. *See* troubleshooting and optimizing tips
 - Options bar, 30, 31
 - parts, 33
 - railings, 388, 388
 - orientation
 - 3D views, 56, 57, 584–585, 584–585
 - fill patterns, 92, 92
 - imported site data, 231–232, 231–232
 - tags, 487
 - walls, 254
 - Origin-to-origin option, 232, 536
 - origins
 - groups, 518–519, 518
 - linked files, 232, 536
 - orienting, 92
 - rotation, 68–69, 69
 - overconstrained objects, 641
 - Overhang parameter, 333
 - overlapping items
 - rooms, 474–475, 474–475
 - walls, 518
 - overrides. *See* Visibility/Graphic Overrides dialog
 - ownership of elements, 628–632, 628–632
- P**
- Paint tool, 76, 77
 - Palladio, Andrea, 1
 - panels
 - curtain, 290, 290, 325, 326, 327, 330, 331
 - SIPs, 567–568
 - parameters and parametric elements, 13–15, 14–15
 - 3D models and families, 3
 - building, 303–307, 303–307
 - modeling, 279–280, 279
 - Annotation object categories, 17
 - arrays
 - creating, 304–305, 304–305
 - in Family Editor, 297, 297
 - base molding, 572, 572
 - bidirectional relationships, 19–22, 20–22
 - change tracking, 607
 - constraints, 22, 23
 - dimensions, 299–300, 300
 - door tags, 499
 - families, 23–28, 24–28
 - imported categories/subcategories, 18, 18
 - linking, 295–296, 295–297
 - mass family creation example, 215–223, 215–223
 - Model Object categories, 15–17, 15–16
 - overriding, 29–30, 29–30
 - shared. *See* shared parameters
 - subcategories, 17–18, 17–18
 - sun shades, 302, 302
 - type and instance parameters, 19
 - views, 18–19
 - visibility, 306, 306
 - parametric change engines, 19
 - Partial Explode option, 636
 - pasting, 63–64, 63
 - .pat files, 93
 - paths
 - keynotes, 506
 - parametric mass families, 221
 - sweeps, 183–184, 184–185
 - patterns
 - balusters, 383–385, 383–385
 - custom, 93–95, 95
 - fill, 90–95, 91–93, 95
 - importing, 94–95, 95
 - line, 87–88, 87–88
 - PDFs in performance, 641
 - performance
 - best practices, 637–642, 637–638, 640–642
 - recommendations, 635–636, 636
 - Perimeter property, 479
 - periods (.) in type-catalog syntax, 141
 - permissions
 - granting, 630–632, 631–632
 - requesting, 629–630, 630
 - perspective views
 - 3D, 56–58, 57–59
 - overview, 412–414, 413–415
 - Phase property, 479
 - Physical tab, 90
 - Pick option, 245

- Pick a line and use the Work Plane it was sketched in option, 163, 163
- Pick a plane option, 163, 163
- Pick Level Graphics option, 64
- Pick Path option
 - parametric mass families, 221
 - sweeps, 184
- Pick Plane option, 164
- Pick Supports tool, 373
- Pick Walls method, 332
- pinning elements, 75
- Place by Face mode, 213
- Place Mass tool, 207, 209, 212
- Place on Face mode, 213
- Place Request option, 630
- Place Similar tool, 64
- Place tab, 397, 397
- placing
 - balusters, 381–383, 382
 - mass families, 212–213, 212–213
 - repetitive units, 517–521, 517–521
 - revision clouds, 603–604, 604–605
 - rooms, 472–475, 472–475
 - tags, 485–486, 485
- Plan/RCP option, 591
- plan regions, 50
- plan views, 40–41, 41
 - default settings, 149
 - Project Browser views, 46–51, 47–51
 - visibility in, 591
- planes. *See* Work Planes
- planning projects, 643
- plywood, 286, 286
- positioning imported files, 232–233
- posts, railings, 379, 379, 381–383, 382–383
- predefined color schemes, 404
- predefined profiles, 185
- predefining keynotes, 512–513, 512–513
- preliminary cost estimate schedules, 446–448, 447–448
- preliminary designs, 427
 - Foundation model. *See* Foundation model
 - sustainability. *See* sustainability
- presentation plans, 405–408, 406–407
- presenting designs, 395
 - animated walkthroughs, 423–424, 424
 - color-coded plans and sections, 401–408, 402–408
 - drawings with shadows, 395–401, 396–401
 - elevations, 408–412, 408–412
 - exporting, 424, 425
 - perspective views, 412–414, 413–415
 - rendering, 415–423, 416–423
- previewing
 - custom walls, 129
 - sun studies, 461
- primary design set options, 260
- primary range for floor plans, 43–44, 43–44
- principles of modeling. *See* modeling principles
- printing
 - 3D services, 225–226, 225–226
 - Design Review, 611, 612–613
 - in performance, 641
- problem-solving designs, 7, 7
- Profile Family template, 319
- profiles
 - 3D content, 283–285, 283–285
 - reveals, 319–320, 321
 - revolves, 178, 180, 181
 - subtractive, 320
 - sweeps, 183–186, 184–186, 319
- programs
 - feasibility, 235–236, 236
 - verification, 205, 205
- Project Browser, 30, 31, 33–34, 34
 - for callouts, 557, 557
 - details, 595, 595, 597, 597
 - for family details, 586
 - for groups, 519, 519
 - nesting links in, 537
 - views, 34–36, 34–36
 - 3D, 56–58, 57–58
 - activating, 39, 39
 - custom organization, 36–37, 36–38
 - elevations, 53–56, 54–55
 - families, 38, 39
 - floor plans, 40–46, 40–46
 - groups, 39
 - links, 38
 - plan views, 46–51, 47–51
 - section views, 51–53, 51–53
 - sheets, 38
- project environment types, 140

project parameters, **224**, **489–491**, *489–491*, **495–496**, *495–496*
 project standards worksets, **620**
 Project Units dialog, *146*, *147*, *342*, *342*
 projection graphics, *16*, *16*
 properties
 elements, **6**, **6**
 rooms, **478–479**
 prototyping, **225–226**, *225–226*
 Publish Coordinates option, *233*, *536*
 publishing to Design Review, **610–612**, *611–613*
 Purge unused dialog, **638**, *638*, *643*
 Purge Unused Elements dialog, *101*
 Pyramid Mass family, *214*, *214*

Q

quantities for design options, **272**, *272*

R

radial arrays, *70–71*, *71*
 radial dimensions, *96*
 Radius setting
 arrays, *304*, *304*
 cylinder mass elements, *214*, *214*
 Rafter property, *335*
 Rafter Cut property, *335*
 railings, **376–378**, *376–378*
 in auditoriums, *392*
 balusters per tread on stairs, **385–387**, *386–387*
 construction, *380*, *380*
 main pattern, **383–385**, *383–385*
 miscellaneous controls, **387–389**, *387–389*
 post settings, **381–383**, *382–383*
 rails, *380*, *380*
 subelements and principles, **378–380**, *379–380*
 on walls, **390–392**, *390–392*
 rapid prototyping, **225–226**, *225–226*
 raytracing, **422–423**
 RCP (Reflected Ceiling Plan) view, *561*
 Read Convention setting, *100*
 recessed walls, hip roofs following, *349*, *349*
 Rectangular Handrail profile, *381*
 recycled materials, **463–464**, *464–465*
 Reference Label settings, *113–114*
 Reference Lines, **159**, *159*

Reference Planes, **157**, *158*, **177**, *177*
 Reflected Ceiling Plan (RCP) view, *561*
 regions
 filled, **553–554**, *553–554*, *573*
 masking, **548**, *549*
 Rehost elements, *165*
 Related to Mass property, *334*
 relationships
 bidirectional, **19–22**, *20–22*
 building mass and underlying mass, **256**, *256–257*
 Relative keynote path method, *506*
 relinquishing permissions, *629*
 reloading
 groups, *526*
 links, *537*
 Remove from Group tool, *521*
 renaming
 dimension types, *99*
 door tags, *499*, *499*
 materials, *88*
 text type, *101*
 rendering, **415–416**
 background, **419**, *419*
 best practices, **423**, *423*
 Design bar, **416–419**
 families, *288*, *288*, **292–293**
 lighting, **416–418**, *417–418*
 materials, **419–422**, *420–422*
 raytracing, **422–423**
 rentable area
 calculations, *430*
 plans, **433–435**, *433–435*
 schedules, *438*
 making, **439–443**, *440–443*
 on sheets, **443–445**, *444–445*
 repetitive details and elements, **515**
 creating and placing, **517–521**, *517–521*, **548–551**, *549–552*
 floors, **575**, *575*
 groups, **516**, *516*, **528–529**, *529*
 for line types, **551**, *552*
 Report Shared Coordinates option, *233*, *536*
 requesting permissions, **629–630**, *630*
 resizing elements, **71–72**, *72*
 Restore All Excluded option, *528*

- reusing details, **594–597**, 595–597
 - Reveal Hidden Elements mode, 53
 - reveals, **319–322**, 320–324
 - Review Warnings option, **643**, 643
 - revision clouds
 - placement, **603–604**, 604–605
 - tagging, **606–607**, 606–607
 - visibility, **603**, 603
 - revision schedules, 124, 124
 - Revision Settings dialog, 602, 604
 - Revisions dialog, 602–603, 602–603
 - Revit City service, 645
 - Revit OpEd blog, 645
 - revolves, **178–182**, 178–183
 - .rfa files, 26
 - Rhino software, **255–256**, 255–256
 - Rich Photorealistic Content (RPC) families, **288**, 288–289, 292
 - ridge skylight roofs, **340–343**, 340–343
 - Rise/1000 setting, 342
 - Riser Thickness setting, 137
 - Riser to Tread Connection setting, 138
 - Riser Type setting, 137, 138
 - Roof by Extrusion tool, 337, 337
 - roofs, 332
 - barrel, 336, 336, 338, 370, 370
 - bidirectional relationships, 20–21, 20
 - complex, 199, 199
 - cone, 368, 368
 - dome, 180, 181, 337, 338, 369, 369
 - by extrusion, **166–170**, 166–170, **336–337**, 336–337
 - by face, **249**
 - flat, 345, 345
 - footprint, **332–335**, 332–336
 - gable, 350, 350
 - with asymmetric slopes, 346, 346
 - Dutch gable with glazed roofs, 355, 355–356
 - Dutch gables, 357, 357–358
 - with extending pergola, 351, 351
 - four-sided, 364, 364–365
 - hip and gable, 352, 352–353
 - gambrel, 353, 353–354
 - half hipped, **360–362**, 360–362
 - hipped, 348–349, 348–349
 - with extruded roof dormers, 366, 366–367
 - with sloped arrow dormers, 359, 359–360
 - with two dormers, 362, 362–364
 - in-place, **337–338**, 338
 - in modeling principles, 170–171
 - multipitch, 371, 371–372
 - ridge skylight, **340–343**, 340–343
 - shed, **344**, 344, 347, 347
 - sloped, 20, **373–375**, 373–375
 - sloped arrows, **343–344**, 343–344
 - sloped glazing, **338–339**, 339
 - types, **133–134**, 134
 - with warped surfaces, **376**, 376
 - Room/Area Reports, 465, 466
 - Room Bounding property, 334, 472, 472
 - rooms, **472**
 - area calculations, **429–430**, 429, **479–480**, 479–481
 - area plans, 430–431, 430–431
 - creating and placing, **517–521**, 517–521
 - design options for, **272–275**, 273–275
 - groups for, **516**, 516, **521–522**, 522
 - overlapping, 474–475, 474–475
 - placing, **472–475**, 472–475
 - properties, **478–479**
 - in section views, **478**
 - selecting, **476–477**, 477–478
 - separation lines, **475–476**, 475–476
 - settings, **145**, 146
 - styles, 484, 484
 - tags, **429–430**, 429, **472–475**, 472–475
 - volume calculations, **479–480**, 479–481, 636, 636
 - window surface percentage, **465**, 466
 - rotating
 - detail components, 551
 - elements, **67–70**, 68–70, 213
 - orientation, 232
 - sweeps, 185, 186
 - RPC (Rich Photorealistic Content) families, **288**, 288–289, 292
- ## S
- Same Place option, 64
 - SAT files
 - importing and linking, 544
 - with Inventor, 256
 - with Rhino, 255

- Save As dialog
 - animated walkthroughs, 424, 424
 - sun studies, 461, 461
- Save Group option, 526
- Save to Central (STC) dialog, 627, 627
- saving
 - shared work, 627–628, 627
 - sun studies, 461, 461
- scale
 - coarse scale fill patterns, 407
 - imported site data, 231
 - in importing and linking, 545
- Scene Lighting dialog, 417–418, 418
- schedules
 - capabilities, 445–446, 446
 - cost, 272, 272
 - creating, 437–439
 - custom parameters, 492, 492
 - graphic appearance of, 448–449, 448–449
 - keynotes, 508
 - keys, 481–484, 482–484
 - link elements, 536
 - massing, 224
 - nested families, 294–295
 - preliminary cost estimates, 446–448, 447–448
 - rentable area, 439–443, 440–443
 - on sheets, 443–445, 444–445, 450
 - technical details, 249–251, 250–252
- schemes
 - color fill, 402–405, 403–405
 - settings, 151
- scope boxes, 161, 161
- Second end blend setting, 190
- section boxes, 583, 583
- Section Head setting, 103
- Section Tail setting, 103
- sections and section views
 - colored, 405, 405–406
 - creating, 405–408, 406–407
 - Project Browser views, 51–53, 51–53
 - rooms in, 478
 - split, 318, 318
 - tags, 103–108, 103–108
 - walls
 - details, 560–578, 560–578
 - keynotes for, 509–510, 509–511
- segmented sweeps, 189, 189
- selections, 61–63, 61–62
 - for copying, 24, 25, 63–64, 404, 404
 - Design Review, 610, 610
 - element editing by, 264, 264
 - floor areas, 246
 - instances, 62, 526, 625
 - layers, 588, 589
 - levels, 529
 - parameters, 123, 123, 498, 498
 - rooms, 476–477, 477–478
 - view templates, 150, 151
- separation lines, 475–476, 475–476
- Set Host option, 392
- sets, design-option, 260–261, 261
- Settings menu, 145, 145
- shades, 186, 186
- shadows and shading, 395–396, 396
 - for analytical purposes, 395–399, 396–399
 - enabling, 397–398, 398
 - for expressive drawings, 395, 396, 399–401, 400–401
 - high-contrast black and white effects, 400, 400
 - materials, 90
 - performance, 401, 639
 - with SketchUp, 254, 254
 - soft, 400, 401
 - sun, 453–454, 453–454
 - sun and shadow studies, 397–399, 397–399
- shaft opening, 598, 598
- shapes
 - elevation tags, 112
 - floors, 133
 - roofs, 133, 372–373, 372–373
- Shared Coordinates settings, 233
- Shared Levels worksets, 619
- Shared Levels and Grids workset, 621
- shared parameters, 292, 489
 - creating, 491–495, 492–494
 - door tags, 497–501, 498–501
 - groups, 493–494, 493–494
 - notes and cautions, 501–502
 - project, 489–491, 489–491, 495–496, 495–496
- shared site plans, buildings on, 534–535
- shared work, saving, 627–628, 627
- shed roofs, 344, 344, 347, 347

- sheets
 - Project Browser views, 38
 - publishing, 611–612, 612–613
 - schedules on, 443–445, 444–445, 450
 - views on, 125, 125
- Shell and Core workset, 621
- shortcuts, keyboard, 78–79, 78
- Show Hidden Lines tool, 554–555, 554–555
- Show option, 631
- Show Opening Height option, 99
- Show View Name setting, 113
- shower fixture, 187, 187
- shutters, 299–300
- silhouette edge displays, 414, 414–415
- SIM (Similar) condition, 560–566, 560–566
- Simple fill pattern option, 92–93, 92
- Single-Day sun settings, 457, 459–460, 460
- SIPs (structurally insulated panels), 567–568
- site data, 230–233, 231–232
- site studies, 204, 204
- Site workset, 622
- size
 - elements, 71–72, 72
 - text, 100, 113, 136
 - type catalogs for, 140
- Sketch 2D Path option, 184
- sketch-based design, 154
 - floors, 154–157, 155–156
 - Work Planes, 157–162
- sketch mode, 23
- SketchUp software, 252–254, 253–254
- skins, exterior, 265, 265
- SKP format
 - importing and linking, 544
 - with SketchUp, 252–254
- skylight roofs, 340–343, 340–343
- skylights, 282
- slicing volumes, 239, 240
- Sloped Glazing Curtain Panel type, 370
- slopes
 - floors, 133
 - railings, 389, 391
 - sloped roofs, 20, 133, 373–375, 373–375
 - barrel, 370
 - ridge skylight roofs, 342
 - slope arrows for, 343–344, 343–344
 - sloped arrow dormers, hipped roofs with, 359, 359–360
 - sloped glazing roofs, 338–339, 339
- smart workflows
 - groups. *See* groups
 - links. *See* links and linking
 - repetitive elements, 515
- snap distance for dimension lines, 99
- soft shadows, 400, 401
- Solid Form options, 174, 174
- solid panels, 326
- solid shapes
 - characteristics, 198–199, 198–199
 - with extrusions, 176, 177
- Sorting tab, 447
- Sorting/Grouping tab, 440–441, 441
- Space parameter for railings, 383
- Spacebar for rotation, 68, 68
- Spacing detail option, 551
- Specify Coordinates at a Point option, 233, 536
- Split Face tool, 76, 77
- Split Region tool, 317, 317
- Split Segment tool, 103
- splitting
 - layers, 317–318, 317–318
 - lines and walls, 74, 74
- Spread Pattern To Fit setting, 384, 385
- stacked walls, 313–314, 313–314
- Stafford, Steve, 645
- Stair Calculator dialog, 135, 136
- stairs, 135, 135
 - balusters per tread, 385–387, 386–387
 - properties, 135–139, 136–139
- standard families, 25–27, 25–27
- Start angle revolve setting, 179, 179
- startup tips, 643–645
- static text, 104
- Still settings for sun studies, 457, 459
- .stl files, 226
- String Reference Planes, 158, 158
- Stringer Carriage Height setting, 139
- Stringer Left/Right setting, 138
- structurally insulated panels (SIPs), 567–568
- Structure option for wall layers, 130

styles

- dimensions, **96–99**, 96–99
- lines, **85–86**, 86, 143
- objects. *See* Object Styles dialog
- rooms, 484, 484
- subcategories, **17–18**, 17–18
- submodels, 639, 641
- Subscription Support, 645
- Substrate option for wall layers, 130
- subtractive profiles, 320
- sun and shadow studies, **397–401**, 397–401, **452–454**, 453–454
 - animated, **458–462**, 459–460, 462
 - exporting, **461**, 461
 - making, **454–458**, 455–458
 - multi-day, 460, 460
 - previewing, **461**
 - settings, 416–417, 417
 - time of day, 457
 - time of year, 459
 - true-color shading, 410, 410
- Sun Shade family, 296
- sun shades, 186, 186
- sunlight, rendering, **416–417**, 417
- sunny vs. overcast days, 468
- supplemental drawings, **607**
- surfaces
 - materials, 90
 - NURBS, 255–256, 255–256
 - units, 142, 146
 - warped, **376**, 376
- sustainability, **451**
 - in architecture, **451–452**
 - energy analysis, **466–468**, 467–469
 - LEED rating system, 452
 - recycled materials, **463–464**, 464–465
 - sun studies. *See* sun and shadow studies
 - window surface percentage vs. room area, **465**, 466
- sweeps, **183**
 - examples, 187–188, 187–188
 - lamp from, **194–196**, 194–196
 - paths, **183–184**, 184–185
 - profiles, 183–186, 184–186
 - trajectory segmentation, 189, 189
 - walls, **319–322**, 320–324

Symbol setting, 115

Symbol at End 1/2 Default settings, 115

symbolic lines, **592–594**, 592–594

system families, **23–24**, 24–25, 127

System Panel Glazed panel, 330

System Panel Solid panel, 330

T

Tab Size setting, 100

tables, revision, 602

tags, **484**, 484

- adding, **436–437**, 436–437

- changing values, **486**, 486

- custom, 101, 102, **116–119**, 116–119, **606–607**, 607

- doors, **486–488**, 488

- loading, **485**

- mass, **223**

- placing, **485–486**, 485

- revision clouds, **606–607**, 606–607

- rooms, **429–430**, 429, **472–475**, 472–475

- untagged elements, **486–488**, 487–488

- in views, **102–103**, 471

- visibility, **603**, 603

- walls, 488, 488

tail graphics in section tags, **107–108**, 107–108

Tangent Joins tool, 387

teams

- communication with, 643

- organizing, **644**

templates

- creating, **81–84**, 82

- custom 3D content, **280**, 280–281

- custom title blocks, 122

- family, 28, 28

- fill patterns, 407

- in performance, 641–642

- strategies, **83–84**

- views, 146, **150**, 150, 407, 407

temporary dimensions, **65–66**, 65

testing design options, 205, 205

text

- annotating, **502–503**

- dimensions, 99

- elevation tags, 112–113, 113

- for graphic consistency, **100–101**, 100–101
- section view tags, **104**, 104
- stairs, 136
- in views, 471
- textnotes, **119–120**, 120–121, **503**. *See also* keynotes
- texture maps, **420–421**, 421–422
- Thermal/Air option, 130
- Thickness column for wall layers, 130
- Thickness/Height of Stringers setting, 138
- 3D DWF option, **611**, 611
- 3D models, 4, 5
 - conceptual, importing, **224–225**, 224
 - context, **233**, 234–235
 - custom content. *See* custom 3D content
 - details
 - annotations, **585–586**, 586
 - creating, **581–586**, 582–586
 - physical, **202–203**, 202
 - printing services, **225–226**, 225–226
- 3D views
 - axonometric, **56**
 - orienting, **56**, 57, **584–585**, 584–585
 - perspective, **56–58**, 57–59, 413, 413
 - section boxes in, **583**, 583
- /3GB switch, **635**
- tick marks, **96–99**, 97–99
- Tile option, 31
- title blocks
 - custom, **121–125**, 121–125
 - revision tracking in, **604**, 604
 - updates in, 606
- TMY2 (Typical Meteorological Year 2) data, 468
- toolbars, 30, 521, 609
- Top setting
 - blends, 190
 - railings, 383
- Top view range for floor plans, 41, 42
- tower shapes, **198**, 199
- tracking changes, **601**
 - Design Review. *See* Design Review
 - parametric modeling and supplemental drawings, **607**
 - revisions, **601–607**, 601–607
- tracking recycled materials, **463–464**, 464–465
- Trajectory Segmentation option, 189, 189
- transferring color-fill schemes, **404–405**, 404–405
- transparency
 - elevation views, **411–412**, 411
 - filled regions, 553, 553
- Tread Thickness setting, 137
- Trim Stringers at Top setting, 138
- trimming
 - lines and walls, **73–74**, 73
 - railings, 387
- troubleshooting and optimizing tips, **635**
 - best practices, **637–642**, 637–638, 640–642
 - blends, **192**, 193–194
 - file corruption, **642–643**, 642–643
 - performance, **635–636**, 636
 - resources for, **645**
 - startup tips, **643–645**
- true-color elevations, **410**, 410
- Truss property, 335
- Twisting blend setting, 191
- 2D DWF option, **611–612**, 612–613
- 2D elements, importing, 597
- 2D line-based families, **285–286**, 286–287
- Type Mark field, 486
- Type Properties dialog
 - callouts, 110–111, 111
 - color fill schemes, 403, 403
 - detail elements, 548, 551, 551
 - dimensions, 96, 97, 99
 - door tags, 118, 499–500
 - elevation tags, 112–114, 112
 - filled regions, 554, 554
 - grid tags, 116
 - for keynotes, 512, 512
 - linking parameters, 295–296, 295
 - profile families, 284–285, 284
 - railing construction, 380, 380
 - text, 101
 - tick marks, 96, 97
 - view tags, 103, 107, 107
 - walls, 128, 132
- Type Selector
 - materials, 76, 77
 - selection by, 63
 - text, 502

types and type catalogs, **139–140**, 140
 3D content. *See* custom 3D content
 creating, **140**, 141
 loadable, 171, 171
 loading from, **142**, 143
 parameters, **19**
 in project environment, **140**
 syntax, **141–142**
 units, **142**
 Typical Meteorological Year 2 (TMY2) data, 468

U

Unbounded Height property, 479
 Underline setting, 101
 Underside of Winder setting, 136, 137
 unenclosed room errors, 473, 474
 units
 settings, **146**, 147
 type catalogs, **142**
 Unjoin Geometry option, 210, 251
 unloading
 links, 537
 unused DWGs and views, 636
 unused elements
 in performance, **638**, 638, 643
 unloading, 636
 updates
 building area schedules, 443
 in title blocks, 606
 Upper Limit property, 478
 usable area calculations, 430
 Use Baluster Per Tread On Stairs option, 385, 386
 Use Common Edge Style option, 145
 Use Function option, 145
 Use Landing Height Adjustment option, 387, 387
 Use OpenGL Hardware Acceleration option, 637
 Use overlay planes to improve performance
 option, 637
 Use Project Settings option, 448
 user interface, **30**, 30
 Design bar, **32–33**, 32
 Design Review, **609–610**, 609–610
 Options bar, **33**
 Project Browser. *See* Project Browser
 View window, **30–31**, 31
 user keynotes, 120, 504, **512**

V

Variable property, 134, 134
 variations to group instances, **525–528**, 526–528
 vaults, **198**, 198
 verifying
 designs, **239–243**, 240–244
 programs, 205, 205
 Vertical tag orientation, 487
 vertices, blend, **191**, 192
 video card options, 637, 637
 View Control bar, 31, 31
 view depth
 floor plans, **44–46**, 44–46
 in performance, 639
 plan views, 48–50, 48–51
 section views, **53**, 53
 View/Floor Plan tool, 239
 view tags, **102–103**, 102
 callouts, **108–112**, 109–112
 elevation, **112–115**, 112–114
 grid, **116**
 levels, **115**, 115
 section, **103–108**, 103–108
 View window, **30–31**, 31, 609
 views, **18–19**
 annotating, **471**, 471
 default settings, **150**, 150–151
 dependent, 17
 drafting, **541–542**, 542, 559
 elevation tags, 113
 importing, **595–597**, 596–597
 keynotes in, **506**, 506
 lists of, 438
 in performance, 638, 642
 perspective, **412–414**, 413–415
 plan, 40–41, 41
 default settings, 149
 Project Browser views, **46–51**, 47–51
 visibility in, 591
 Project Browser. *See* Project Browser
 on sheets, **125**, 125
 for sketches, 157
 templates, 146, **150**, 150, 407, 407
 worksets, 619–620

visibility

- chairs, **306–307**, 306–307
 - conditional, **296**, 297
 - details, **591–592**, 591–592
 - extrusions, 175, 175
 - link, **537–538**, 538
 - mass elements, **207–208**, 207–208
 - revision clouds and tags, **603**, 603
 - Work Planes, **164**, 164
 - worksharing files, 618
- Visibility/Graphic Overrides dialog, 9, 9, 29, 29
- CAD details, 546
 - cost schedules, 272, 272
 - design options, 266, 266
 - exterior skins, 265
 - fill patterns, 407
 - graphics, **143–145**, 143–144
 - imported CAD files, 636
 - line patterns, 87
 - mass elements, 207–208
 - Project Browser views, 35
 - room elements, 273
 - room separation lines, 475, 477
 - schedules, 444
 - site data, 230
 - worksets, 621, 623–625
 - worksharing files, 618, 618
- Void Form options, 174, 174
- void shapes, 176, 177, **198–199**, 198–199
- Void Sweep option, 221
- volume
- rooms, **479–480**, 479–481, 636, 636
 - slicing, 239, 240
 - units, 146

W

- walkthroughs, 58, 413, **423–424**, 424
- Wall by Face tool, **246**
- Wall Editor, 131
- walls, **127–128**, 128
 - articulation, **315–318**, 315–318
 - bidirectional relationships, 20–22, 22
 - compound, 315, 315
 - cores, **309–311**, 310–311

- curtain, **325–326**, 325–326
 - designing, **326–329**, 327–329
 - doors and windows, **330**, 331
 - panels, **330**, 331
 - custom, **128–129**, 129
 - default wrapping, **131–132**, 132
 - layers, **129–131**, 130–131
 - preview window, **129**
 - defaults, **148**
 - disjoining, **313**, 313
 - finish materials, **316–318**, 316–318
 - functions, 133
 - host-based families, 282, 282
 - in-place, **324**, 324
 - join editing, **312**, 312
 - layer join cleanup, **311–312**, 312
 - levels of detail, **132**, 133
 - in modeling principles, 170–171
 - offsetting, **74**, 75
 - overlapping, 518
 - railings on, **390–392**, 390–392
 - rotating, 68
 - sections
 - details, **560–578**, 560–578
 - keynotes for, **509–510**, 509–511
 - splitting, **74**, 74
 - stacked, **313–314**, 313–314
 - sweeps and reveals, **319–322**, 320–324
 - tags, 472, 484, 484, 488, 488
 - trimming and extending, **73–74**, 73–74
 - wrapping, **319**, 319
- warnings
- reviewing, **643**, 643
 - tags, 473, 474
- warped surfaces, **376**, 376
- Weak Reference Planes, 158, 158
- Weld setting, 387
- width
 - elevation tags, 113
 - Insulation tool, 552
 - shutter, 300
 - text, 101
- Window.rft template, 282
- window surface percentage, **465**, 466

windows

- curtain wall, **330, 331**
 - defaults, **148**
 - host-based families, **282, 282**
 - in modeling principles, **171, 171**
 - with muntins, **299, 299**
 - rotating, **68**
 - selection, **62**
 - types, **135**
- witness lines, **98**
- work plane-based families, **288, 292**
- Work Planes, **157**
- grids, **160–161, 160, 164, 164**
 - levels, **159–160**
 - operations, **164–165, 164–165**
 - overview, **161–162, 162**
 - Reference Lines, **159, 159**
 - Reference Planes, **157, 158**
 - roofs by extrusion, **166–170, 166–170**
 - visibility, **164, 164**
 - working with, **162–165, 163, 165**
- workflows, **625**
- central files, **626, 626**
 - local files, **626–627, 626**
 - massing studies, **203–204**

smart

- groups. *See* groups
 - links. *See* links and linking
 - repetitive elements, **515**
 - worksets, **623**
- worksets, **617–618, 618, 620–621, 621**
- moving elements between, **623–625, 624–625**
 - organization, **621–623, 622–623**
 - in performance, **639**
 - permissions, **630, 631**
- worksharing, **617**
- basics, **619–621, 619–620**
 - element ownership, **628–632, 628–632**
 - mistakes in, **629**
 - in performance, **637**
 - saving shared work, **627–628, 627**
 - workflows, **625–627, 626**
 - workset methods. *See* worksets
- wrapping walls, **319, 319**
- Wraps column for wall layers, **131, 131**

X

X-References, **9**













