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*All SMCo carpenters
are responsible for understanding
this Carpenter Manual.*

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Types of Carpenters

There are four types of SMCo carpenters: Apprentice Carpenters, Carpenters, Assistant Project Leads, and Project Leads. Each is described below. Later in the manual we detail what each needs to be able to do.

(A) APPRENTICE CARPENTER

An Apprentice Carpenter is new to the field, learning to be a Carpenter. From the beginning, an Apprentice needs to have a basic understanding of processes that are encountered daily on the job. These include but are not limited to:

- Set up and wrap up
- Keeping work areas tidy
- Proper material storage
- How to keep busy productively

An Apprentice Carpenter works with a Carpenter or Project Lead who teaches them about the task being performed, how we do it, and why we do it that way. Over the course of a job, the Apprentice Carpenter will be given unsupervised opportunities to perform work that they have become familiar with. This work is assessed by the Project Lead and discussed with the Apprentice. It is assumed that in two to four years an Apprentice Carpenter will become a Carpenter.

(B) CARPENTER

A Carpenter is skilled craftsman who is able to do all aspects of rough and finish carpentry. A Carpenter is expected to be a reliable, capable, and supportive member of a crew.

(C) ASSISTANT PROJECT LEAD

An Assistant Project Lead does everything that a Carpenter does, but is expected to have a better understanding of the project and the work of the various trades. An Assistant Project Lead is expected to help the Project Lead run the job and is in charge when the Project Lead is absent.

(D) PROJECT LEAD

A Project Lead runs a project in collaboration with the Project Architect. A Project Lead is responsible for the people working on the site and their safety, the condition of the site itself, and the production of the required work. A Project Lead also has some office responsibilities – they help with planning, design, estimating, and scheduling.

General Expectations & Conventions

All SMCo employees are responsible for the *Shared Expectations & Practices* described in the main body of these Operating Policies. Additionally, for all SMCo carpenters, here are some important daily considerations.

- **Safety comes first.** We continually work to upgrade our practices. If you feel unsafe, it is likely others do as well, so say something! Don't be shy. There is always more than one way from point A to B. Even if it takes longer, we must stay safe. For details on our current practices, please read the *South Mountain Company Occupational Health & Safety Manual* (see Appendix A).
- **Reliability.** SMCo generally allows employees some measure of personal flexibility in the work schedule, but in the field the most important daily driver of productivity is the crew as a unit. Work is not just an annual hours obligation, but a daily obligation. As a member of a crew, there is an important obligation to be on the job at the proper time with the proper tools. Hours are set by each Project Lead for their crew. If it is not possible to be there, or if you will be late, it is essential to notify the Project Lead as much in advance as possible. If you need to be late or depart early, communication is key. It's your responsibility.
- **The Crew.** As mentioned, overall crew function is the key to production and is an essential part of daily work as well as smooth and profitable job flow. Crew participation is about sharing equally in all the daily activities. Occasionally, schedule dictates extra effort and all are expected to share this, even when it may not be convenient.
- **Big Picture Awareness.** Every job has myriad technical, aesthetic, financial, and schedule goals, with a lot of thinking behind them. Much of this is contained in the plans, specs, schedules, and estimates available on

site and on Smartsheet. Study of these will aid in your work and your professional development.

- **Methods.** While we strive for uniform results, there may be multiple ways to get there. Go with the flow, be aware, and learn from your surroundings – we don't reinvent things every job, just sometimes.
- **Cleanliness.** Wear the dirtiest clothes you want, but keep a sharp eye on the tidiness of the project site. Our project sites reflect the care we put into our work and a clean one will also contribute to safe and efficient daily operation. If there is a spare moment when you are not sure what to do next, clean up for a bit.
- **Good Communication** is essential to the function of our company. If you see something, speak up. Your voice is welcomed and important. Do we need nails on the job? Are we forgetting something? Tell your Project Lead.
- **Good Work** means steady, deliberate forward progress. Try to anticipate the next step and the next. Try to internalize South Mountain methods; whatever you're doing, you are likely to be doing it again! Next time you can do it better and probably faster. Be aware and focused on the job. If you are idle, get materials ready, or get something for a coworker, or clean up. Nothing wrecks job flow faster than loafing and chatting with someone who was previously working productively. And then there's the cell phone!
- **Cell Phones.** These days the phone is ubiquitous, but it shouldn't be visible around the project site except at break or lunch. Much of our design/build communication relies on these phones, but unless your communication is job-related please save it for your own time.
- **Parking.** Please consider where you park at the project site. Do you need to unload heavy things? Might others? Will you be in the way of deliveries, machinery, or workflow throughout the day? We work on many tight project sites and parking is often an issue, particularly once trade partners join us at different parts of the job. Carpooling and biking are optional and encouraged, but if you drive, please be sure to park courteously (most likely that means not right in front).
- **Material from Suppliers** is most economical if delivered to the project site. If the crew works together to remember what might be needed when

the Project Lead orders, costly individual trips can be minimized. As always, thinking ahead is the key.

- **Side Jobs / Outside Employment.** We have very specific policies about side jobs. It is your responsibility to fully understand them and abide by them. In the main body of these Operating Policies, see *Shared Expectations & Practices/Operations/Outside Employment*.
- **Administration.** Administration and management staff work very hard on your behalf to make sure the office runs smoothly – wages, health insurance, benefits, communication, and countless other things that are important to your welfare. When they ask you to do something, or produce some paperwork, or whatever else, it's important to make it a priority. Get it done. Now would be good. Be sure to check your SMCo digital communication platforms daily during the work week.
- **Successful Jobs** are those that come in on schedule and budget, showing exemplary craft. The best jobs are those where we learn new things and surprise even ourselves with what we've accomplished.

Quality & Tolerances

As Apprentices and Carpenters progress, they are exposed to more complicated elements of construction on a regular basis. Elements such as roofs (simple and compound), stairs, handrails, timber frames, and cabinetry are examples of more specialized work. Dedicated time and self-directed learning must take place outside of the workday to begin to understand the concepts (see below: *Information Resources*).

Aside from the basic skills that any carpenter must have, we expect our Carpenters to become proficient in math, especially geometry, and project site drawing techniques. These are critical tools that add efficiency to our work.

(A) LEVELS OF QUALITY

Perfection is different from quality (quality does not always imply perfection). There are appropriate levels of quality for different tasks. Profitable production hinges on the premise that we do some work more roughly in order to have the time to do other work more carefully. Mostly these decisions are made by the Project Lead, but it is useful to ask as you work and internalize these standards. Obsession with non-essential details can derail forward progress.

All that being said, sloppy work is sloppy work. Moving quickly, with less finesse, for the sake of progress is sometimes appropriate. But that's different than careless or thoughtless work. There's no place for that. Our work says a lot about who we are and how we were feeling on that particular day. Take pride in your work.

(B) TOLERANCES

Generally speaking, the tolerances for rough framing are much greater than they are for trim and finish, but there is no reason why joists, studs, jacks, headers, legs, cripples, and rafters should not all be the same relative length within 1/16".

Inevitably, even when all framing is cut well, there will still be slight discrepancies in overall lengths and widths, square, etc. This is the nature of the work.

On the job, clear communication during framing assembly usually works to alleviate any misinterpretations of tolerances. For example, if we are framing a roof, the carpenter at the ridge will talk to the carpenter on the plate. When the carpenter on the plate has the seat cut nice, they will say so. It will be obvious if the rafter is too long, short, or just right at this time, and any discrepancies will be assessed as a group.

Tolerances during trim and finish work, interior and exterior, should be small. All finish work should be impeccable.

Information Resources

Basic learning and ongoing learning are essential parts of the job of a carpenter. We encourage training opportunities.

We also believe there is essential information that you should be exposed to. During the first year that you are here, we suggest you work with the following:

- [Why We Build Superinsulated Buildings](#), by Marc Rosenbaum
- [Carpentry Apprenticeship Manual](#), Parts 1-12 (Basic Carpentry)
- [From the Ground Up](#), by John Cole and Charlie Wing
- [Dwelling House Construction](#), by Albert Dietz
- [House Carpentry Simplified](#), by Nelson Burbank
- [Carpentry](#), by Leonard Koel
- [Carpentry and Building Construction](#), by John Feirer and Gilbert Hutchings

All of these books are in our library. The most effective way to learn carpentry from books is to read about what you expect to be doing in the coming days and weeks. Different books treat things in different ways. Sometimes it's good to read from several. Say you're about to frame a floor. See what several of the books above have to say about framing a floor.

Additionally, JLC online offers some instructional videos. Some videos can also be found on YouTube, but the quality varies greatly.

Time spent studying is paid time. Put it on your time sheet. Please use that time efficiently.

Tools

Tools You Need. At the end of this manual is a list of hand and power tools that we recommend for all carpenters. There are three categories: essential, recommended, and optional. Until you are fully equipped with all the essential and recommended tools, your tool allowance should be devoted to purchasing those tools.

Protocol. Within any given day or week, tools are often shared, swapped, borrowed, etc. We are quite flexible about this, but please make sure that you are prepared for work and generally have all the tools you are expected to have and are likewise willing to share. When picking up at the end of the day, it is considered poor form to pack up your personal tools before the crew tools are put away.

Tool Ordering, Part Ordering, and Sending Tools for Repair are services provided by SMCo Production Support. *For tool repairs:* Find a box that the tool will fit into, but do not seal the box. Communicate what is wrong with the tool by contacting Peg, either in person or with a note. Leave the box and the tool at Peg's desk. Include the battery if this is a cordless tool. SMCo will pay for tool repairs. *For tool parts:* Send Peg a picture of the serial number tag on the tool, and communicate which part needs to be ordered.

Maintenance. It is your responsibility to keep all tools sharp and in good working condition at all times.

Common Carpentry Callbacks

These are the most common reasons for callbacks, so they should always get considerable attention. It is particularly important for carpenters to learn to handle these things skillfully.

- Doors, especially exterior
 - Door too tight
 - Poor strike-catch alignment
 - Mortise locksets
- Screen doors
- Cabinet doors and drawers
- Leaks (usually flashing, plumbing vents, etc.)
- Crawl space mold and rot
- Window and window trim rot
- Deck board rot
- Fogged insulating glass
- Casement window function

Field Skills & Knowledge

Here are the basics that you need to understand and be able to do in each of the following field positions. We anticipate that an Apprentice will have a two to four year learning timeframe before becoming a Carpenter. A Carpenter may be designated as an Assistant Lead, and eventually a Lead, after demonstrating the additional skills and knowledge described below.

Carpenter	
1. Set up transit, shoot grades and % of slope	26. Basic timber framing
2. Lay out foundations	27. Install exterior doors
3. Install piers	28. Install windows
4. Build and set up batter boards	29. Install bulkhead doors
5. Insulate a foundation	30. Install skylights
6. Frame floors	31. Hang screen doors
7. Frame walls	32. Prep for blower door test
8. Frame a simple gable roof	33. Flashing and air sealing methods
9. Frame hips and valleys	34. Install strapping
10. Plumb and straighten a building	35. Install appropriate blocking
11. Build a rough stair	36. Build a finish exterior stair
12. Set up appropriate staging for different tasks	37. Interior trim windows
13. Install temporary fall protection guardrails	38. Interior baseboard
14. Apply sheathing	39. Install interior doors
15. Apply rigid foam	40. Install interior door hardware
16. Apply exterior running trim	41. Install cabinets
17. Exterior trim windows and doors	42. Install appliances
18. Prep for roofing	43. Basic forklift operation and management
19. Prep for gutters	44. Sharpen and maintain tools
20. Prep for siding	45. Shop orientation and basic skills
21. Install rainscreen	46. Read plans
22. Frame decks	47. Understand basic geometry
23. Install decking	48. Understand nominal & actual lumber sizes
24. Install porch ceilings	49. Calculate board footage
25. Assemble screened porch frames	50. Use a variety of mobile, cloud-based communication tools
	51. Think ahead
	52. Know when to ask for help

Assistant Project Lead	
1. Everything that a Carpenter needs to know how to do (see list above)	9. Exercise thoughtfulness and care in conversations with clients and subs
2. Build a finish stairway	10. Assist Project Lead with identification of crew strengths and how and where to use each crew member
3. Understand complex roof geometry, including how to construct a roof with unequal pitches	11. Excellence and consistency in communication with Project Lead
4. Schedule and coordinate work of trade partners	12. Working knowledge of mechanical and electrical systems
5. Handle all aspects of running a job in Project Lead's absence	13. Knowledge of building code by acquiring construction supervisor's license or working diligently toward that end
6. Assist Project Lead with proper planning for materials with long lead times	14. Use web-based project management and collaboration tools to access and document project details
7. Understand coordination with design team and trade partners for product delivery	15. Demonstrate leadership and relation-building skills
8. Know when to make judgment calls and when to seek counsel from Project Lead	

Project Lead	
1. Everything that an Assistant Project Lead needs to know how to do (see list above)	12. Judgment and decision making – looking at costs and benefits of decisions to choose the right path
2. Create and manage job schedules	13. Systems – having a strong working knowledge of all building systems (i.e. plumbing, heating, HVAC, excavation, electrical, and solar PV)
3. Materials take-offs	14. Quality Control – having ability to be responsible for quality control on the job
4. Estimate labor	15. Flexibility – understanding of job ebbs and flows, ability to roll with the punches
5. Awareness of budget as job progresses	16. Negotiation – ability to reconcile differences and bring others together to make job flow
6. Excel facility	
7. Smartsheet facility	
8. Team-building skills	
9. Leadership and relationship-building skills	
10. Teaching skills	
11. Complex problem solving – identifying problems and developing and implementing solutions	

Tool List

Hand Tools

Essential Hand Tools

1. Tape measure (25' 16')
2. Tool pouch (lightweight)
3. Hammer (straight claw)
4. Retractable razor knife (heavy duty straight blades, hook blades)
5. Nail sets (small, med, large)
6. Pencils
7. Large crayon
8. Caulk line (red, blue, and white)
9. Framing square (stainless steel or aluminum, with rafter tables)
10. Sliding bevel square
11. 6" Combo Square
12. Compass able to draw 12" circle
13. 4' level
14. 1" chisel
15. 2" timber chisel
16. Flat bar
17. Cats paw
18. Crow bar (gorilla bar)
19. Square nuts (stair gauge)
20. Awl
21. 4-in-1 Screwdriver
22. Large pullsaw
23. Block plane (low angle)
24. Safety glasses
25. Speed square

Recommended Hand Tools

26. Butt gauge
27. 12" Combo square
28. Steel rule (stiff, flexible)
29. Pin punch

Optional Hand Tools

30. Leather mallet
31. Roof framers bible
32. Dykes (nail pullers)
33. Vice grips (assorted sizes)
34. Allen key set (SAE, metric)
35. 2' & Torpedo levels
36. Large flat screwdriver
37. Shingle hatchet
38. Shingle rip
39. Hacksaw
40. Assorted pullsaws

41. Hook scraper
42. Rabbet plane
43. Assorted files
44. Knee pads
45. Zip tape squeegee
46. 100' Tape measure
47. Putty knife
48. Screen roller
49. Hand maul
50. Cold chisel
51. Scribes
52. Tin snips
53. Painter's bar
54. Wire brush
55. Bolt cutters
56. Slipjoint pliers
57. Large crescent wrench
58. Key hole saw
59. Brad punch

Power Tools

Essential Power Tools

60. Circular saw (7" 15amp)
61. Cordless impact driver (18 volt or higher lithium)
62. Cordless drill (18 volt or higher lithium)
63. Construction Master calculator (Trig Plus)
64. Nail gun (available on site)

Recommended Power Tools

65. Circular saw (8 1/4" or larger)
66. Cordless Circular saw (18 volt or higher lithium)
67. 4" Grinder Multitool (Feinsaw, etc.)
68. Cordless reciprocating saw (18 volt or higher lithium)
69. Laser line level
70. Laser dot level

Optional Power Tools

71. Jig saw
72. Reciprocating saw (higher the amps the more power)
73. Power plane (3 1/4", lightweight)
74. Orbital pad sander
75. Belt sander (lightweight helpful)
76. Drill
77. Router
78. Laminate trimmer
79. Power cords (25' 50' 100')
80. Pick up truck with lumber racks and tool box



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