

south  
mountain  
COMPANY

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# Carpenter Manual

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This training manual is for all SMCo Carpenters | April 2019

# Carpenter Manual



*As well as digesting the contents of this manual, new employees are expected to fully understand the SMCo Operating Policies. Both of these are contained in the SMCo Employee Handbook.*

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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.

**APPRENTICE CARPENTERS** are new to the field, learning to be Carpenters. From the beginning, they need 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*

Apprentice Carpenters work 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 un-supervised opportunities to perform work that they have become familiar with. This work is assessed by the Project Lead and discussed with the apprentice Carpenter. It is assumed that in two to four years an Apprentice Carpenter will become a Carpenter.

**CARPENTERS** are skilled craftsmen who are able to do all aspects of rough and finish carpentry. They are expected to be reliable, capable, and supportive members of a crew.

**ASSISTANT PROJECT LEADS** do everything that Carpenters do, but they are expected to have a better understanding of the project and the work of the various trades. They are expected to help the Project Leads run the job and they are in charge when the Project Lead is absent.

**PROJECT LEADS** run our projects in collaboration

with the Project Architect. They are responsible for the people working on the site and their safety, the condition of the site itself, and the production of the required work. They also have some office responsibilities – they help with the planning, design, estimating, and scheduling.

# General Expectations & Conventions

Here are some important daily considerations:

**SAFETY COMES FIRST.** We continually work to upgrade our practices and will continue to do so. If you feel unsafe it is likely others would 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. Please see Appendix A of the Operating Policies (South Mountain Company Occupational Health & Safety Manual) for details on our current practices.

**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 his/her 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.

**SCHEDULED ABSENCES.** You must use the calendar for reporting absences from work in advance. It is essential that the office knows when people are at work or not. You must learn to use our company online calendar. The COO (Deirdre) can assist if you need help with this. All employees must observe the following Absences policies:

(1) Generally: SMCo allows employees some measure of personal flexibility in their work schedule. Since much of our work, however, is team-based, employees have a responsibility to coordinate and communicate regarding regular hours, planned absences, and unplanned absences. There is a daily

obligation as well as the annual hours obligation to satisfy.

(2) Unplanned Absences: If you are going to be absent from work, arrive late, or depart early, it is important to notify your supervisor as far in advance as possible.

(3) Planned Absences: Always indicate planned absences on the SMCo online calendar. It is important to notify your supervisor as far in advance as possible, and it is essential that Administration knows when people are at work or not.

(4) Shop & Office Personnel: Always check in/out with Administration as you enter/leave the building. Please be sure to let them know where you are and when you will be back.

(5) Timesheets: Enter your timesheet information every week, by the end of the day Sunday, using the online application "Harvest."

**THE CREW.** As mentioned, overall crew function is the key to production and is an essential part of daily processes 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.

# General Expectations & Conventions

CONTINUED

**CREWS ARE DIFFERENT.** They each have different habits and practices. Although we strive for uniform results there are many ways to skin a cat, and different people do things different ways. Go with the flow, be aware, and learn from your surroundings - we don't re-invent things every job, just sometimes.

**CLEANLINESS.** Wear the dirtiest clothes you want but keep a sharp eye on the tidiness of the jobsite. Our jobsites 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. Get materials ready if you are idle; get something for a coworker who isn't, 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 jobsite 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 jobsite. 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 jobsites and parking is often an issue, particularly once the subcontractors 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 jobsite. 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 WORK.** We have very specific policies about side jobs. It is your responsibility to fully understand them and abide by them. Here they are:

Side jobs must always be secondary to consistent performance at SMCo and should not intrude on the workday in any way. Everyone needs to come to work fully prepared to concentrate on work and in good condition to perform the work. All employees must observe the following side job policies:

(A) Communication: No side job communication should happen at any time during the workday with the exception of scheduled breaks (except caretaking emergencies).

(B) Leaving the Jobsite: No side job trips should happen at any time during the work day, except maximum 30 minutes away from work during lunch (except caretaking emergencies).

# Quality & Tolerances

As Apprentice Carpenters 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 the Information Resources section).

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

**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. 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.

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, he or she 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 on-going learning are essential parts of the job of a Carpenter. We encourage training opportunities.

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

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

All of these are in our library. The most effective way to learn carpentry from books is to read about what you're about to be doing (the next day or the next week). 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 and some 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.

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# Tools

**TOOLS YOU NEED:** At the end of the document is the 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 essential and recommended tools, your tool allowance should be devoted to those.

**PROTOCOL:** Within any given day or week, tools are often shared, swapped, borrowed etc. We are quite flexible about this but please make sure 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 & REPAIR SEND-OFF** is a service provided by SMCo, and we pay for repairs. Production Support (Peg) handles this.

Here's how to do it: Box it, put a note inside that says what's needed, if it's a cordless tool always include the battery, and give to Production Support (Peg).

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

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# The Most Common Callbacks

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

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

# SMCo Headquarters

A lot happens at the SMCo office, shop, and yard. It's a busy place. Generally there are roughly 15-20 people working here in Administration, Architecture, Engineering & Energy Technology Services, and the Shop. It's important to know your way around, to know everyone and know what they do, and to respond when something is needed from you.

**ADMINISTRATION:** New employees receive a full administrative orientation. The Administration staff works 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.

**SHOP:** As part of your orientation, you will spend a day or so in the Shop to familiarize yourself with its operations and how it relates to the jobs. You will cover the following:

- i. Who works in the Shop
  - a. Introductions
- ii. Intro to Stationary Machines
  - a. Table saws & sliding table saw
  - b. Planers & jointers
  - c. Band saws
  - d. Other
- iii. Materials Tour
  - a. Hardware Room
  - b. Inside lumber
  - c. Outside lumber and beams
- iv. Billing Material
  - a. How to find material lot #

- b. Using the inventory list
- c. Picking material
- d. Returning material
- v. Use of the Shop
  - a. Personal projects
  - b. Side jobs
  - c. Sharpening

**ARCHITECTURE:** We will also introduce you to the workings of Architecture. You will cover:

- i. Who works in Architecture (“2D”)
  - a. Introductions
  - ii. Review a drawing set
    - a. Construction document basics if necessary
    - b. Where to find information in a drawing set
    - c. SMCo drawing conventions
    - d. Smartsheet
  - iii. Review specs, an estimate, and a timesheet
  - iiii. Where to find archived information
    - a. Old vs. digital job binders
    - b. Archived drawing sets
    - c. Photos

## **ENGINEERING & ENERGY TECHNOLOGY SERVICES:**

Finally, you will be introduced to the workings of Engineering & Energy Technology Services.

- i. Who works in Energy
  - a. Introductions
  - ii. What do we do?
    - a. Solar
    - b. Engineering for our jobs
    - c. Consulting
    - d. Building diagnostics
    - e. Monitoring

# What Does A Carpenter Need To Know How To Do?

There comes a point when an Apprentice Carpenter has become a Carpenter. What's that point? What do you need to know how to do? Here are the basics that a Carpenter needs to understand and be able to do. We anticipate a two to four year learning timeframe.

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

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# What Does An Assistant Project Lead Need To Know How To Do?

*(in addition to what a Carpenter needs to know)*

1. Building a finish stairway
2. Understanding complex roof geometry, including how to construct a roof with unequal pitches
3. Scheduling and coordinating work of subcontractors
4. Handling all aspects of running job in Project Lead's absence
5. Assisting Project Lead with proper planning for materials with long lead times
6. Understanding coordination with design team and subcontractors for product delivery
7. Knowing when to make judgment calls and when to seek counsel from Project Lead
8. Thoughtfulness and care in conversations with clients and subs
9. Assisting Project Lead with identification of crew strengths and how and where to use each crew member
10. Excellence and consistency in communication with Project Lead
11. Working knowledge of mechanical and electrical systems.
12. Knowledge of building code by acquiring construction supervisor's license, or working diligently toward that end
13. Facility with current information technology used on sites, including web based project information/management systems, proper cell phone protocol, consistent and timely electronic communications, consistent and proper record keeping in electronic formats
14. Demonstrating leadership and relation-building skills

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# What Does A Project Lead Need To Know How To Do?

*(In addition to what an Assistant  
Project Lead needs to know)*

An Assistant Project Lead may be designated as a Project Lead through proven experience as an assistant Project Lead and after demonstrating knowledge and capability in the following areas:

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

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# Conclusion

That's it for now. Hopefully you have digested and internalized everything in this manual. This essential information will help you to grow and thrive as an SMC Co Carpenter. Carpentry is one of the essential things we do as a company. Craftsmanship is at the core of our values. About 40% of the employees of South Mountain are Carpenters: Apprentice Carpenters, Carpenters, Assistant Project Leads, and Project Leads.

Do good work, support your colleagues, learn a lot, and enjoy yourself.



If you see anything in this manual that is incorrect or out-of-date, or if there's anything you think should be added, please speak to me.

Thanks,

Newell

# Power Tool List

ESSENTIAL POWER TOOLS	RECOMMENDED POWER TOOLS	OPTIONAL POWER TOOLS
Circular saw (7" 15amp)	Circular saw (8 1/4" or larger)	Jig saw
Cordless impact driver (18 volt or higher lithium cordless)	Circular saw (18 volt or higher lithium cordless)	Reciprocating saw (higher the amps the more power)
Cordless drill (18 volt or higher lithium cordless)	4" Grinder	Power plane (3 1/4", lightweight)
Construction master (Trig Plus )	Multitool* ( Feinsaw etc)	Orbital pad sander
Nail gun (available on site)	Cordless reciprocating saw (18 Volt or higher lithium cordless)	Belt sander (lightweight helpful)
	Laser line level	Drill
	Laser dot level	Router
		Laminate trimmer
		Power cords (25' 50' 100')
		Pick up truck with lumber racks and tool box

# Hand Tool List

ESSENTIAL HAND TOOLS	RECOMMENDED HAND TOOLS	OPTIONAL HAND TOOLS
Tape measure (25' 16')	Butt gauge	Leather mallet
Tool pouch (lightweight)	12" Combo square	Roof framers bible
Hammer (straight claw)	Steel rule (stiff, flexible)	Dykes (Nail pullers)
Retractable razor knife (heavy duty straight blades, hook blades)	Pin punch	Vice grips (asst.)
Nail sets (small, med, large)		Allen key set (SAE, metric)
Pencils		2' & torpedo levels
Large crayon		Large flat screwdriver
Caulk line (red, blue, and white)		Shingle hatchet
Framing square (stainless steel or aluminum, with rafter tables)		Shingle rip
Sliding bevel square		Hacksaw
6" Combo Square		Assorted pullsaws
Compass able to draw 12" circle		Hook scraper
4' level		Rabbit plane
1" chisel		Assorted files
2" timber chisel		Knee pads
Flat bar		Zip tape squeegee
Cats paw		100' Tape measure
Crow bar (gorilla bar)		Putty knife
Square nuts (Stair gauge)		Screenroller
Awl		Hand maul
4-in-1 Screwdriver		Cold chisel
Large pullsaw		Scribes
Block plane (low angle)		Tin snips
Safety glasses		Painter's bar
Speed square		Wire brush
		Bolt cutters
		Slipjoint pliers
		Large crescent wrench
		Key hole saw
		Brad punch



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