

## APPENDIX B

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# Carpenter Manual



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

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# Contents

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<b>TYPES OF CARPENTERS</b>	<b>68</b>
<b>GENERAL EXPECTATIONS AND CONVENTIONS</b>	<b>69</b>
<b>QUALITY AND TOLERANCES</b>	<b>70</b>
<b>INFORMATION RESOURCES</b>	<b>71</b>
<b>TOOLS</b>	<b>71</b>
<b>COMMON CALLBACKS</b>	<b>72</b>
<b>WHAT DOES A CARPENTER NEED TO KNOW HOW TO DO?</b>	<b>72</b>
<b>WHAT DOES AN ASSISTANT PROJECT LEAD NEED TO KNOW HOW TO DO?</b>	<b>74</b>
<b>WHAT DOES A PROJECT LEAD NEED TO KNOW HOW TO DO?</b>	<b>75</b>
<b>POWER TOOL LIST</b>	<b>76</b>
<b>HAND TOOL LIST</b>	<b>76</b>

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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.

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# 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 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.
- **Crews are Different.** They 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 reinvent 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. 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 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 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 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.

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## 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 jobsite 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. 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.

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# 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.

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# 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 & Repair Send-Off** is a service provided by SMCo, and we pay for repairs. Here's how to do it: Box the tool, put a note inside that says what's needed, if it's a cordless tool always include the battery, then give the box 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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# Common 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

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# What Does a Carpenter Need to Know How to Do?

There comes a point when an Apprentice Carpenter has become a Carpenter. What is 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.

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1. Set up transit, shoot grades and % of slope

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  2. Lay out foundations

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  3. Install piers

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  4. Build and set up batter boards

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  5. Insulate a foundation

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  6. Frame floors

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  7. Frame walls

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  8. Frame a simple gable roof

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  9. Frame hips and valleys

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  10. Plumb and straighten a building

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  11. Build a rough stair

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  12. Set up appropriate staging for different tasks

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  13. Install temporary fall protection guardrails

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  14. Apply sheathing

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15. Apply rigid foam

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  16. Apply exterior running trim

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  17. Exterior trim windows and doors

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  18. Prep for roofing

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  19. Prep for gutters

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  20. Prep for siding

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  21. Install rainscreen

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  22. Frame decks

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  23. Install decking

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  24. Install porch ceilings

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  25. Assemble screened porch frames

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  26. Basic timber framing

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  27. Install exterior doors

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  28. Install windows

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  29. Install bulkhead doors

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  30. Install skylights

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  31. Hang screen doors

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  32. Prep for blower door test

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  33. Flashing and air sealing methods

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  34. Install strapping

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  35. Install appropriate blocking

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  36. Build a finish exterior stair

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37. Interior trim windows

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  38. Interior baseboard

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  39. Install interior doors

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  40. Install interior door hardware

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  41. Install cabinets

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  42. Install appliances

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  43. Basic forklift operation and management

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  44. Sharpen and maintain tools

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  45. Shop orientation and basic skills

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  46. Read plans

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  47. Understand basic geometry

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  48. Understand nominal & actual lumber sizes

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  49. Calculate board footage

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  50. Think ahead

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  51. Know when to ask for help
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# What Does an Assistant Project Lead Need to Know How to Do?

A Carpenter may be designated an Assistant Project Lead through proven experience as a skilled carpenter and after demonstrating knowledge and capability in the following areas:

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1. Everything that a Carpenter needs to know how to do (see list above)

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  2. Build a finish stairway

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  3. Understand complex roof geometry, including how to construct a roof with unequal pitches

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  4. Schedule and coordinate work of subcontractors

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  5. Handle all aspects of running a job in Project Lead's absence

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  6. Assist Project Lead with proper planning for materials with long lead times

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  7. Understand coordination with design team and subcontractors for product delivery

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  8. Know when to make judgment calls and when to seek counsel from Project Lead

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  9. Exercise thoughtfulness and care in conversations with clients and subs

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  10. Assist Project Lead with identification of crew strengths and how and where to use each crew member

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11. Excellence and consistency in communication with Project Lead

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  12. Working knowledge of mechanical and electrical systems

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  13. Knowledge of building code by acquiring construction supervisor's license or working diligently toward that end

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  14. Facility with current information technology used on sites, including web-based project information/management systems, proper cell phone protocol, consistent and timely electronic communications, and consistent and proper record keeping in electronic formats

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  15. Demonstrate leadership and relation-building skills
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# What Does a Project Lead Need to Know How to Do?

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:

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1. Everything that an Assistant Project Lead needs to know how to do (see list above)
  2. Create and manage job schedules
  3. Materials take-offs
  4. Estimate labor
  5. Awareness of budget as job progresses
  6. Excel operations facility
  7. Smartsheet operations 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
  12. Judgment and decision making - looking at costs and benefits of decisions to choose the right path

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13. Systems - having a strong working knowledge of all building systems (i.e. plumbing, heating, HVAC, excavation, electrical, and solar PV)
  14. Quality Control - having ability to be responsible for quality control on the job
  15. Flexibility - understanding of job ebbs and flows, ability to roll with the punches
  16. Negotiation - ability to reconcile differences and bring others together to make job flow
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# Power Tool List

## Essential Power Tools

- Circular saw (7" 15amp)
- Cordless impact driver (18 volt or higher lithium cordless)
- Cordless drill (18 volt or higher lithium cordless)
- Construction Master calculator (Trig Plus)
- Nail gun (available on site)

## Recommended Power Tools

- Circular saw (8 1/4" or larger)
- Circular saw (18 volt or higher lithium cordless)
- 4" Grinder Multitool (Feinsaw, etc.)
- Cordless reciprocating saw (18 Volt or higher lithium cordless)
- Laser line level
- Laser dot level

## Optional Power Tools

- Jig saw
- Reciprocating saw (higher the amps the more power)
- Power plane (3 1/4", lightweight)
- Orbital pad sander
- Belt sander (lightweight helpful)
- Drill
- Router
- Laminate trimmer

- Power cords (25' 50' 100')
- Pick up truck with lumber racks and tool box

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# Hand Tool List

## Essential Hand Tools

- Tape measure (25' 16')
- Tool pouch (lightweight)
- Hammer (straight claw)
- Retractable razor knife (heavy duty straight blades, hook blades)
- Nail sets (small, med, large)
- Pencils
- Large crayon
- Caulk line (red, blue, and white)
- Framing square (stainless steel or aluminum, with rafter tables)
- Sliding bevel square
- 6" Combo Square
- Compass able to draw 12" circle
- 4' level
- 1" chisel
- 2" timber chisel
- Flat bar

- Cats paw
- Crow bar (gorilla bar)
- Square nuts (stair gauge)
- Awl
- 4-in-1 Screwdriver
- Large pullsaw
- Block plane (low angle)
- Safety glasses
- Speed square

**Recommended Hand Tools**

- Butt gauge
- 12" Combo square
- Steel rule (stiff, flexible)
- Pin punch

**Optional Hand Tools**

- Leather mallet
- Roof framers bible
- Dykes (nail pullers)
- Vice grips (assorted sizes)
- Allen key set (SAE, metric)
- 2' & Torpedo levels
- Large flat screwdriver
- Shingle hatchet
- Shingle rip
- Hacksaw
- Assorted pullsaws

- Hook scraper
- Rabbet plane
- Assorted files
- Knee pads
- Zip tape squeegee
- 100' Tape measure
- Putty knife
- Screen roller
- Hand maul
- Cold chisel
- Scribes
- Tin snips
- Painter's bar
- Wire brush
- Bolt cutters
- Slipjoint pliers
- Large crescent wrench
- Key hole saw
- Brad punch



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