



PCTA Trail Skills College Curriculum Instructor Planning Guide



Course 208. Trail Sign Installation & Inventory

Be much more sign savvy! Understand trail sign specifications and learn how to install signs correctly. Learn to record sign inventory records in conjunction with agency partners. Students must be seasoned hikers experienced with map reading, have some experience with basic tools, be detail-oriented with clear hand writing, and be comfortable learning to use digital devices.

STUDENT SKILL OUTCOMES:

- Understand why clear trail signs are important.
- Understand the two important kinds of trail signs: guide signs and reassurance markers, and the standards for each.
- Understand the difference between signs outside and inside wilderness.
- Correctly install the different kinds of signs at trailheads and junctions.
- Learn effective sign post installation.
- Practice paper sign inventory and understand the importance of accuracy.
- Understand the variations in sign design, inventory, and installation among the different land management agencies along the PCT.

KEY TERMS:

guide signs, reassurance markers, sign inventory, pressure-treated post, copper naphthenate, cairn, right of way, Wilderness

TRAIL MAXIM:

"If you don't know where you are, you could end up anywhere"; "If you come to a fork in the trail, take it" -- Yogi Berra

TOOLS NEEDED PER 8 STUDENTS:

2 fire shovels, 2 small chisel-tipped rock bars, 2 tamping bars, 6" and 10" crescent wrenches, sturdy socket wrench set, pruning saw (preferably straight edged), pole saw, 2" wood chisel, claw hammer & 1" block of wood for fulcrum, "torpedo" or other short level, brace & bits to pre-drill for lag screws. If harvesting posts, a saw and draw knife. If installing "Carsonite" signs, a pre-driver and driver.

MATERIALS NEEDED:

- Example guide signs (Ideally, some of these signs will need to be installed during class.):
 - trailhead and junction
 - wilderness and non-wilderness
 - PCT reassurance markers
 - 18", 9", and 3 1/2" plastic or metal
 - 5 1/2" wood
 - Carsonite signs
- 8 pin flags or lath stakes
- 4" aluminum nails
- 4-5" lag screws to fit sign holes (preferably 3/8" diameter).
- If installing a new trailhead sign: 6" x 6" pressure treated post.
- If installing a new junction sign: 6-10" diameter 7' treated or rot-resistant native round post, or tools to harvest and peel one on site copper naphthenate or alternative wood preservative, brush and can, 8-10" spikes.
- Digital camera
- 4 clipboards with pencils and sign inventory forms (several blank [ideally copied on Rite in the Rain paper] and one correctly filled out).
- Laptop computer, digital projector and screen for PowerPoint; alternatively have printed versions to pass around.
- Copy of Chapter 5 of U.S. Forest Service Sign Manual

WORK SITE REQUIREMENTS:

a trailhead and trail junction (preferably on the PCT and ideally in need of sign installation or repair), a trail/road crossing, a place to show digital images.

KEY CONCEPTS:

- 1) Safety Documents and Concerns: Personal Protective Equipment (PPE), Job Hazard

- Analysis (JHA), Tailgate Safety Session (TSS), Emergency Action Plan (EAP)
- 2) Types of Trail Signs:
 - guide
 - reassurance markers
 - Wilderness
- 3) Sign Inventory: Standard forms and digital images
- 4) Sign Installation: pressure-treated versus native posts versus trees
- 5) Specifications:
 - 24" deep
 - 5' to sign
 - 3' from trail edge
- 3/8" lag screws
- spacers
- notching
- 6) Reassurance Markers: for trail junctions, road crossings and unclear sections
 - plastic versus wood PCT logo markers
 - mounting locations:
 - trees
 - posts
 - Carsonite
 - rock cairns and ducks
- 7) Sign Maintenance and Ordering
- 8) Report work promptly

BACKGROUND

Sign inventory and installation are absolutely essential components of trail work. Well-installed and accurate signs insure that trail users know where they are and where they are going. This is to say, it prevents people from getting lost! Though sign work is not everyone's cup of tea, for special detail-oriented people, it can be very gratifying work.

Because the U.S. Forest Service is the lead agency for the Pacific Crest Trail, most of the information that follows is drawn from the U.S. Forest Service Sign Manual. Those who work along the PCT in National or State Parks or on Bureau of Land Management managed land, will need to consult local managers for additional guidelines.

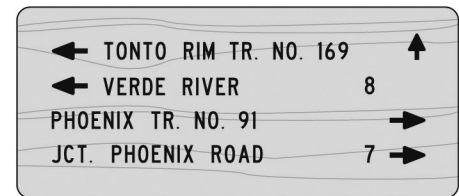


Figure 1. Typical non-Wilderness trail “guide” sign. Wilderness junction guide signs do not indicate mileages. (IMAGE COURTESY OF USFS)

Types of Trail Signs

The Forest Service divides trail signs into to five main categories: **guide signs**, **reassurance markers**, regulatory signs, warning signs, and interpretive signs. The first two categories concern PCTA volunteers the most. Guide signs are used at trailheads and trail junctions. On the PCT, reassurance markers are used at junctions, road crossings and other places where the trail is not clear.

Signs inside **Wilderness** areas differ significantly from those outside wilderness. In general, installation of signs is minimized in Wilderness areas. More specifically, guide signs inside Wilderness at trail junctions never include mileages, and destinations are optional — only trail names and/or numbers are commonly used. This is because Wilderness areas are designated by Congress to provide natural landscapes in perpetuity, as little marred by humans as possible. Because Wilderness travel is meant to provide adventure and require greater skill, use of a map is assumed — thus the minimal signs. Because approximately 40 percent of the PCT is inside designated Wilderness areas, hiking the PCT is meant to be more challenging than, say, the Appalachian Trail where mileage is posted and blazes are painted at regular intervals all along the trail.


Be sure to review the trail sign chapter of the Forest Service sign manual at <http://www.fs.fed.us/t-d/pubs/htmlpubs/em7100-15/page28.htm#s512> As the lead agency for the PCT, this is the most important sign manual, but if you teach primarily in an area managed by another agency, review their manual as well (see References).

If in your area a portion of the PCT travels on easements across private land, be sure to work with PCTA staff and agency partners to familiarize yourself with special signs used to raise trail user awareness of such trail sections. Note also that on some private easements, users other than hikers and horses may be allowed on the trail.

Sign Inventory

An accurate sign inventory is useful for many purposes but is essential to allow replacement of signs that are stolen, burned, or otherwise found to be missing. In turn, if fieldwork for a sign inventory is done on paper, it should be digitized in some way and regularly backed up. Obviously, digitized sign inventories are also more easily shared than paper ones. If nothing else, there should be a digital photo of each sign as part of a paper sign inventory.

It is always essential to coordinate sign inventory work with local agency partners. The various agencies and even different National Forests along the PCT use different sign inventory paperwork and methods. However, the default sign inventory form for the Forest Service should be the TRACS (TRail Assessment Condition Survey) Sign Inventory form available at http://www.pcta.org/help/volunteer/vol_rec.asp

 **Quality Work:** In addition to accurate field entries, most inventories require an overview digital photo of the junction showing the location of all the signs, as well as close up photos clearly showing the complete text of all the signs. Be sure to note if you believe that the text of the signs or their locations should be changed to be clearer, for when the sign is replaced. There are many unclear, inaccurate, and poorly installed signs in the world that need to be improved — don't assume because a sign is there that it is correct or up to standard.

Some agencies (mostly highway departments) have begun to use very expensive digital equipment that combines GPS, data recorders and cameras for sign inventories. To date, the author is not aware of any land managers using such a system for trails, though it seems likely soon. Given the remote areas covered by trail sign inventories and the fallibility of technology, one retired computer professional who now volunteers for PCTA suggested that Rite in the Rain paper and a number 2 pencil are still the best tools for the job. Of course, paper forms filled out in the field must later be entered into a computer data base and digital photos inserted into the documents. Regardless, for any technology used for inventory, be sure to carry extra batteries, and backup paper and pencil.

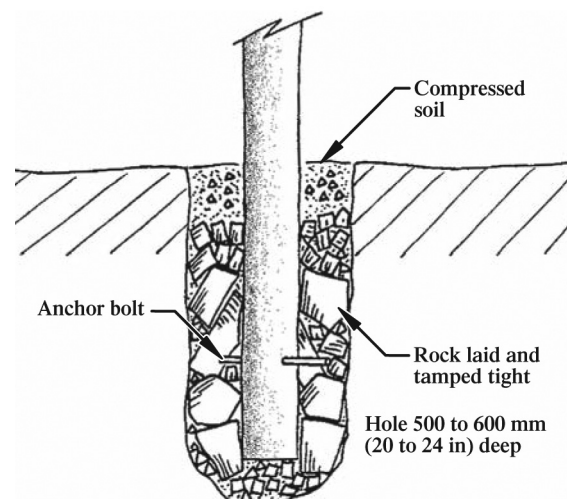
Sign Installation

The Forest Service sign manual allows installing signs on either installed posts or live trees. Posts offer the advantage of locating signs exactly where you want them to insure that users see them. However, **pressure-treated** posts are difficult to transport and native posts require regular replacement for rot. Different land managers have their preferences so should be consulted in these decisions.

Trailhead sign posts should be pressure-treated dimensional 6"x 6". Junction signposts are normally round, whether pressure-treated or native, and should be a minimum of 6" diameter. Though some use 4"x 4" pressure-treated junction posts, round posts allow notching signs into the post at oblique angles to match odd trail junction angles, providing for enhanced clarity. Though pressure-treated wood is not generally used in Wilderness, hand treating the butt end planted in the ground and any cuts with copper naphthenate or some other wood preservative is highly recommended for native posts.

All posts are to be buried 24" and the bottom of signs

Figure 2. The key to solid posts is vigorously tamping the rock and soil with a rockbar, as you fill the hole. Spikes or lag screws can be used at the base of the post to improve anchoring. Top off the hole with mounded soil to accommodate settling and prevent water from puddling around the post. (IMAGE COURTESY OF USFS)



should be about 60" off the ground. Thus posts need to be about 8' long. Position the top edge of signs two inches below the top of the post. Tops may be beveled or sloped away from the sign face. The closest edge of a sign should be at least 3' from the edge of the tread to allow adequate clearance for packstock.

In deep snow country, especially on side-slopes, shorter posts may be warranted to reduce leverage of snow creep tipping the posts. Rocks packed into the post hole can help stabilize them as well. Hammering two to four large spikes 6" up from the bottom of a post can also make it sturdier. In snow country, signs must be notched into the post and lag bolted with two 4-3/8" bolts or the snow will rip them off the post. Through-bolts are better still, though are often impractical for native posts that vary in diameter, unless a hack saw is used to cut off the ends of extra long bolts.

When signs are mounted on live trees, use a pole saw to cut limbs flush well above the sign to keep it visible even if limbs grow or droop from rain or snow. Select trees that are healthy, near the trail, and clearly visible. If there is no suitable tree, a post is a better bet. To allow for tree growth after installation many managers specify spacers of a style they prefer—"trex" plastic lumber is a good choice so it does not split and fall off. If snow load is a problem, lags should be snug but then backed off at regular intervals to prevent tree growth from splitting the sign.

All signs should be installed perpendicular or parallel to the trail directions and affixed using zinc-plated lag screws or through-bolts (the coating protects them from the corrosive effect of wood preservative and tree sap). NEVER use spikes or nails to install a sign as it does not allow for future adjustments or removal.

Some sources suggest notching, pre-drilling and treating posts in the shop before carrying them to a junction in the field. This is fine ONLY IF you are absolutely certain of the configuration of the junction where the post will be installed. All too often, sign installers are surprised to find trails coming together at oblique angles or many other unexpected situations that make them wish they had brought along the tools to prepare the post on site to match particular conditions. The more remote the trail junction, and the less certain one is about local conditions, the more sense it makes to carry in all the necessary tools and supplies.

Where theft or vandalism of signs is a problem, tamper-proof hardware will be needed, and two to four spikes driven into the post near its base.

If digging is sometimes impossible in the area you are working because of impenetrable bedrock, practice alternatives such as building rock baskets (sometimes made of heavy-gaged sheep fencing) or solid rock cairns surrounding a post. Consulting local agency partners will be key for such areas, as they will likely have their preferred way to deal with such situations (see Watson "Reference" below for additional guidance). HOWEVER, MAKE SURE that it really is impossible to dig a hole. Someone skilled and persistent with a chisel-tipped rock bar can often find a place to dig an adequate hole, though it may be hard work.

If there are fast growing brush, tree limbs, or tree seedlings that will soon obscure signs, be sure to remove it thoroughly before setting a post and then maintain the area regularly. Best is to avoid such locations, if possible. If a sign must be installed near aggressive brush, be sure to cut it back thoroughly including digging out roots, to minimize the need for future maintenance.

Guide sign placement and installation is covered in Chapter 5A of the Forest Service Sign Manual at <http://www.fs.fed.us/t-d/pubs/htmlpubs/em7100-15/page32.htm> and includes some useful diagrams. The Forest Service Trail Maintenance Notebook at <http://www.fhwa.dot.gov/environment/fspubs/07232806/page13.htm> also has some useful advice.

Reassurance Markers

An essential feature of the PCT is the presence of 3-1/2", 9" and 18" official PCT logo reassurance

markers within sight, both north and south, of every side trail junction and road crossing of the PCT. Inside Wilderness areas 5-1/2" square branded wood PCT markers are used instead of the 3-1/2" marker for trail junctions. PCTA volunteers should carry reassurance markers and appropriate fasteners when they scout and lead trail maintenance projects. The replacement of these markers is as important as a safe tread for hiker and equestrian users.

When possible the 3-1/2" and 5-1/2" markers are installed on living trees, clearly visible from the junction sign, looking both north and south along the PCT. Markers on trees are securely installed 7' off the ground with 4" aluminum nails hammered to leave space for tree growth 3/4" (approximately the diameter of an index finger). Steel nails can damage saws and injure sawyers if struck unexpectedly. Some installers suggest using a single nail as it allows for easier removal when the tree has grown up to the head of the nail or markers otherwise need to be moved.

If no appropriate trees are available, markers can be mounted on posts planted visible north and south of the junction. In deep snow country, such posts should be planted securely 24" deep with markers about 5' above the tread so they are not knocked over by the snow. If no other option exists, markers may be mounted on the north and south side of the junction sign post, but if the PCT takes a right or left turn, this can be confusing and should be avoided if at all possible.

Other than at trail junctions, PCT markers are used only where essential to make the trail clear. They are used even more sparingly in Wilderness areas. In areas where the confusion lasts for a fair distance (e.g., when the PCT coincides with a dirt road for a few hundred feet), install markers on both sides of trees or posts so that each is just visible from the next, until the PCT tread resumes clearly.

In the past, diamond-shaped blazers, usually gray, white, or blue, have been installed along the PCT — they should be removed, especially in wilderness.

Outside Wilderness areas in treeless areas such as the Southern California desert a variety of other reassurance markers may be specified by the local managing agency. Possibilities include flexible fiberglass "Carsonite" posts or wood post route markers, with or without 3 1/2" PCT markers. Consult agency partners to ensure consistent standards are met. This link shows Forest Service standards http://www.fs.fed.us/t-d/pubs/htmlpubs/em7100-15/page30.htm#fig5_12

Other kinds of reassurance markers may include rock cairns and guide poles. The decision to build rock cairns should be made with agency partners, especially in Wilderness areas where the presence of human-built structures is to be minimized. Areas where snow lies late into the normal hiking season may need cairns with guide poles built into them to increase its visibility. This is to insure that trail users do not get off course, creating damaging multiple trails.

Figure 3. PCT reassurance markers:
9" plastic or metal (top) and 5 1/2" wood
sign for use in Wilderness areas (bottom).



Small piles of rocks, a.k.a rock ducks or ducks, may be used for a short period of time if new trail tread is unclear, but they should be removed as soon as the tread is easily followed. Volunteers who find unnecessary “rock ducks” should remove them at every opportunity, especially in Wilderness.

Although used on other National Scenic Trails, cutting or painting blazes in trees is not used and is discouraged along the PCT.

Trailheads and Road Crossings

At PCT trailheads, a 9” logo should be attached 1” below the trailhead identification sign or on a separate post in a prominent location.

For PCT road crossings, install 9” PCT markers on either side of county or Forest Service roads with speeds less than 35 mph. Mount the markers 1” below the guide sign identifying the trail or its destinations. If no such sign exists at the road crossing, the marker should be mounted on a separate post to identify the trail. Its use is intended only as a symbol associated with the trail. The words are not intended to be read by motorists.

Placement of 18” PCT markers for crossings of Forest Service roads with speeds greater than 35 mph, as well as all county, state, and other federal roads require coordination between the governing road agency and the adjacent land managing agency. Because the markers are to be visible (though not legible) to the motoring public they will likely need to be posted inside the ***right of way*** of the road, thus requiring road agency installation. If you have a location that is in need of 18” signage, please contact your PCTA regional representative.

Sign Maintenance

Trail guide signs installed on living trees need their lag screws loosened regularly to allow for tree growth. For this task, volunteers should carry an adjustable crescent or spanner wrench. If it has been a number of years since lag screws have been backed off, a 10” wrench with sufficient leverage will likely be needed.

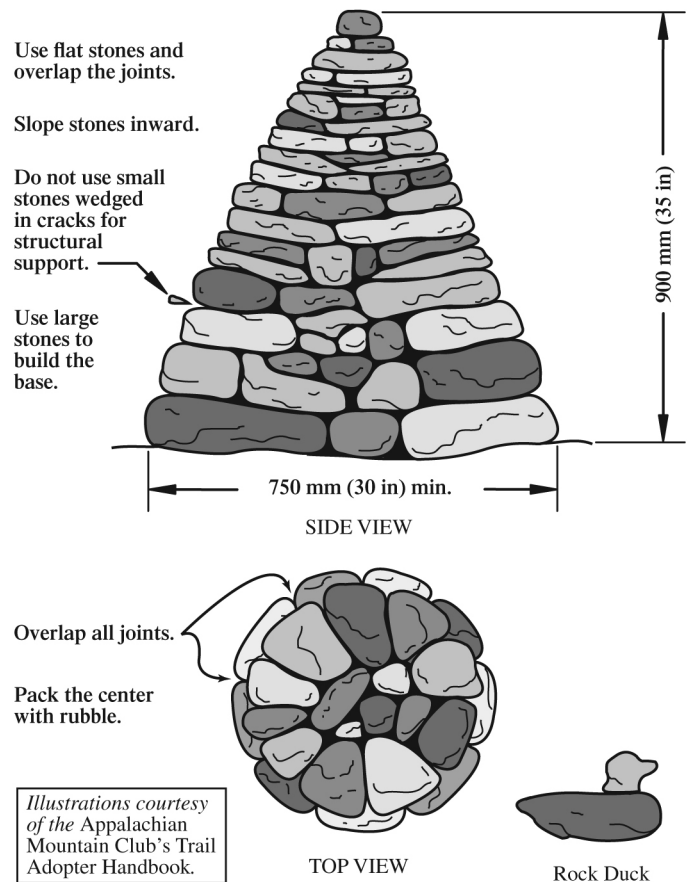
Replacing rotting posts will be an ongoing task where signs are mounted on untreated posts. Removing unnecessary reassurance markers and blazers, especially in Wilderness areas, is a good task for volunteers.

Sign Ordering

Ordering new signs is done by a PCTA Regional Rep working with the PCT Program Manager or other agency partner, though volunteers can be trained to help.

Note that on all guide signs, “Pacific Crest Trail” should be spelled out and NEVER abbreviated PCT or PCNST, because many trail users are not familiar with these. They are also not approved sign manual

Figure 4. Properly constructed rock cairn to mark a trail.
(IMAGE COURTESY OF USFS)



abbreviations, only “Trail” may be shortened to “TR” if necessary. If volunteers see guide signs with PCT or PCNST (alas, not unusual), they should report them in need of replacement.

The following is advice from two long-time dedicated PCTA volunteers who were involved in sign projects. “The takeaway I suggest is that a signing project simply **MUST** follow proper and thorough research and planning. The question marks need to be all gone by the time some crew lugs a 40 pound post 15 miles into the wilderness.”

“To me the critical aspect of sign work is having accurate ground data. You can’t place a good sign order without visiting all the sites and taking notes. Maps are frequently inaccurate, showing junctions in the wrong place; trail numbers wrong and indicating abandoned trails as active. This is not a job that can be done in an office.”

Sign Construction

Volunteers with excellent woodworking skills might be enlisted to make trail signs, if equipment is available. It is essential to be perfectly clear about design expectations so that wood and time is not wasted. Such an extraordinary volunteer needs special training to follow the exacting standards of the relevant agency sign manual. Forest Service sign dimensions are shown at http://www.fs.fed.us/t-d/pubs/htmlpubs/em7100-15/documents/chap_05b.pdf and layout is covered at <http://www.fs.fed.us/t-d/pubs/htmlpubs/em7100-15/page29.htm> .

TEACHING TIPS & TECHNIQUES

As instructor, visit your field areas before the class to see if some sign work needs to be done, so you can bring the right tools and supplies.

Types of Trail Signs

You might begin the class with a discussion of students’ experience with trail signing. Have they been on trails with missing or unclear signs that compromised the pleasure or safety of a backcountry trip? What kinds of confusion arose and do they remember what about the signs (or lack of them) that caused it? Any PCT thru hikers in the group who can comment on their experience following the trail from Mexico to Canada? Ask them to guess how many trail signs there are on any given National Forest (500-3,000) and how often they might need to be replaced (every 2-20 years)? How would they keep track of all those signs spread over hundreds of square miles)? The point is it’s a BIG job.

Pass around sample signs and explain different types of signs: guide signs (trailhead and junction) and reassurance markers. There are also interpretive, regulatory, and warning signs, but less relevant to this class. Show the full array of sign materials that are used in the area where you are instructing, whether wood of various types or synthetic material. Flexible fiberglass “Carsonite” signs are common in some areas, but only outside wilderness and are not used at all in some areas.

BE SURE TO CLARIFY why junction signs in Wilderness areas are different than those outside wilderness. See “Background” section above for details.

If you have access to a collection of sign images, a laptop computer and digital projector, you might begin with a slide show of the good, bad, and the ugly of signing. In addition to images of the various types of signs and sign materials, show images of various sign installations, both correct and deficient. You might include signs obscured by vegetation, snow damaged signs barely hanging on a tree, signs mounted on trees that have since grown, breaking the sign. Signs chewed by animals beyond legibility, signs on posts broken from rot or snow damage. Include images of properly installed trailhead and junction signs (both in wilderness and not), as well as PCT reassurance markers (again, both in wilderness and not). If relevant, show images of signs on private property.

If you do not have access to technology for your class, you might bring a collection of printed sign

photos that include as many of the issues described above as possible. Quiz students on what kinds of signs they are seeing in the images to reinforce the distinctions.

You might pass around a copy of Chapter 5 of the Forest Service Sign Manual to stress that we must follow standards carefully so that hikers find similar clear signing along the full length of the PCT. As the lead agency for the PCT, Forest Service standards guide signs the length of the trail. However, discuss that the different land management agencies (NPS, BLM, state parks) through which the PCT passes likely have different sign standards on the trails across their land leading to the PCT.

Sign Inventory

Wherever instructing this course, obtain a copy of the forms used locally and, by all means, invite a local staff person responsible for sign inventory to co-teach this class with you. If your local host does not have a form they use or like, suggest the Forest Service TRACS (TRail Assessment Condition Survey) Sign Inventory form.

Quality Work: Hand out clipboards to each team of two with blank sign inventory forms. Also provide an already correctly filled out form to serve as a guide. Proceed to a trailhead (PCT, if reasonable) and review the form as a group. Have each team fill out the form for the signs they see. Proceed to a nearby junction and have everyone fill out another inventory form for the junction signs as well. Have everyone practice taking the kinds of digital photos needed of the signs. Review sign inventory “Background” above for points to emphasize.

Ask volunteers to carry copies of the TRACS sign inventory forms at all times, so they can report missing or damaged signs in a format that agency personal can utilize. Ask them to provide digital photos as well.

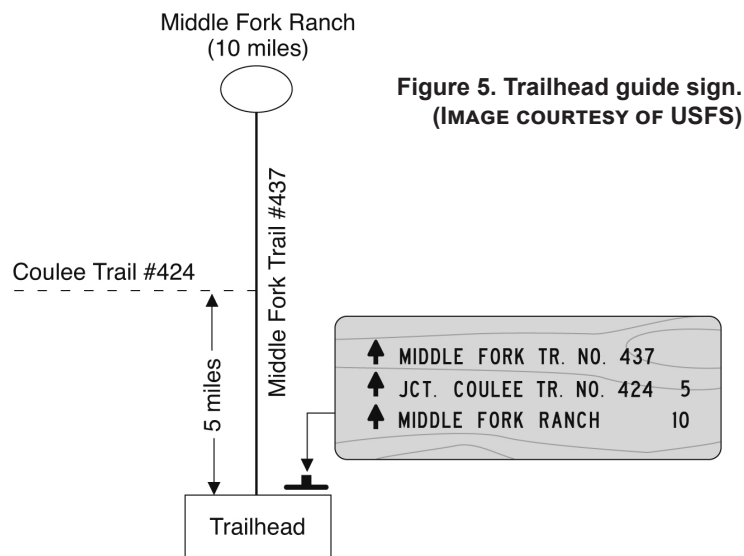


Figure 5. Trailhead guide sign. (IMAGE COURTESY OF USFS)

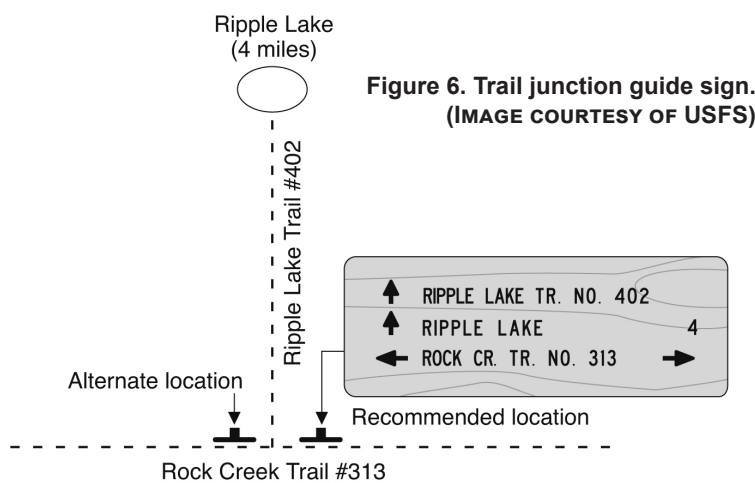


Figure 6. Trail junction guide sign. (IMAGE COURTESY OF USFS)

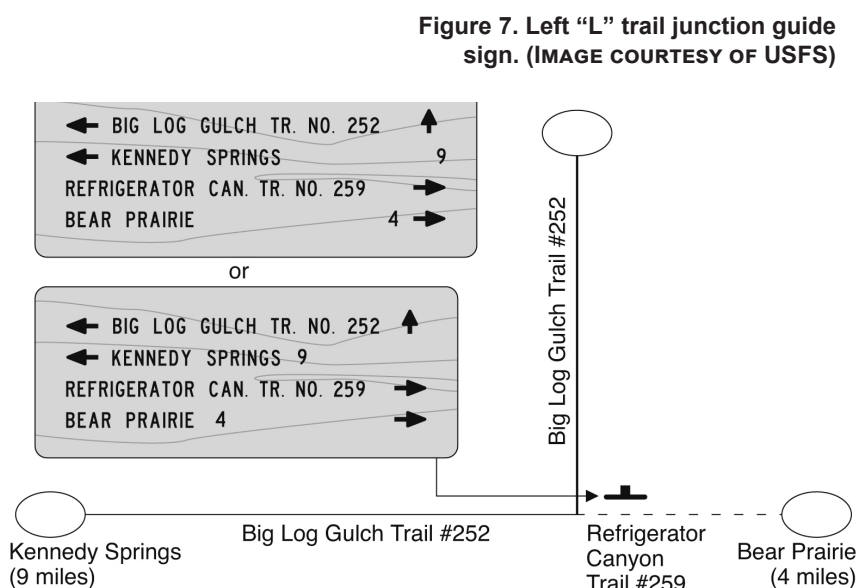


Figure 7. Left “L” trail junction guide sign. (IMAGE COURTESY OF USFS)

Note: Wilderness signs would show no mileages, and rarely destinations, rather simply trail names and numbers.

Sign Installation

Ideally, have the class install new signs that need to be installed, following protocols for the area in which you are working. Stress that some standards may vary from area to area and that it is essential to seek and follow the guidelines of local managers. Variables may include whether junction signs are mounted on posts or live trees (and if so, with or without bark removal and/or spacers for tree growth). If posts are used, whether they are native (harvested on site), or imported (either pressure treated or a special rot-resistant untreated post, such as juniper or locust). Also, protocols for chemical treatment of post bases and saw cuts may vary. Measurements should follow agency standards outlined in “Background” section above.



Safety Awareness: Working with copper naphthenate and sawing pressure-treated wood require special precautions because they are toxic. Eye protection, long-sleeved shirt, and gloves are required to prevent penetration of chemicals through the skin. When cutting pressure-treated wood, always work up wind and wear a dust mask or respirator if there is any chance of breathing sawdust or significant fumes. Afterwards be sure to wash hands and any other skin exposed to the chemicals.

The key is for students to get HANDS ON EXPERIENCE: 1) notching posts; 2) safely treating cuts and bases of posts with copper naphthenate; 3) pre-drilling for lag bolts; 4) leveling signs; 5) choosing the correct number, diameter and length of lag bolts, appropriate for snow load; 6) digging a sufficiently deep hole (24”), but no wider than necessary (soil excavated should be stockpiled, not just scattered about); 7) tamping vigorously and adding rocks to stabilize posts to withstand snow load, resting hikers, and animal rubbing; 8) plumbing posts while tamping; 9) stepping back to evaluate the final product, testing it vigorously, and being willing to re-do the work if it is not up to standard. Especially setting posts, remember that snow, animals, and hikers will inevitably stress the post—it must be bomb proof.

If no new signs need installing, you can either remove and reinstall existing signs (hopefully making improvements), or install and then remove signs that do not need installing. Most Forest Service ranger districts have extra uninstalled signs in storage that could be made available for practice installation. If you are going to teach this class regularly, ask agency contacts to give you signs that might be thrown away so you have them on hand for classes (there are often signs with misspelled words, inaccurate mileages and such that are headed to the dump). Hands on practice is essential!



Trail Eyes: At a junction have students, in their teams of two, each propose and defend their best location for a signpost and also for PCT reassurance markers following standards outlined above. They can use the pin flags or lath stakes to mark their proposed sign post location. Make sure one person holds up a post while the other steps at least 50’ back in all four directions to assess the visibility of the proposed location at the junction. Insure that signposts will not be in the way of pack stock.

If digging is commonly impossible in the area you are working, because of impenetrable bedrock, practice alternatives such as building rock baskets (sometimes made of heavy-gaged sheep fencing) or solid rock cairns surrounding a post. Consulting local land managers will be key for such areas, as they will likely have their own preferred way to deal with such situations (see also Watson reference for special guidance).

HOWEVER, MAKE SURE that it really is impossible to dig a hole. Someone skilled and persistent with a chisel-tipped rock bar can often find a place to dig an adequate hole, even though it may be hard work. It might seem odd, but practicing digging post holes is useful for inexperienced workers, especially if the instructor demonstrates how obstacles can often be removed with a rock bar.



Tool Care: Be sure to stress the difference between rockbars and digging/tamping bars, and how easy it is to bend the latter if inappropriately used for levering rocks.

Reassurance Markers at Junctions, Trailheads, and Road Crossings

Have students practice installing appropriate markers at trail junctions, both wilderness and non-wilderness. Best practice is to have two people; one person installing the reassurance marker and

the other person at the trail junction providing guidance for the optimal location and orientation of the marker. Make sure to remove enough branches, all around and well above the marker so the drooping or growing branches will not obscure the marker -- this will likely require a pole saw.

PCTA has a guide to installation of these reassurance markers; review their document carefully at http://www.pcta.org/help/volunteer/vol_rec.asp and provide copies to all students, as well as to all trail stewards.

Also, practice installing a 9" reassurance marker at a road crossing and trailhead if possible. At the very least, visit such installations and review the standards.

Sign Maintenance

If there are trail signs installed on living trees that need their lag screws loosened, by all means have the class tend to this. Even if it doesn't need doing, have students try both a 6" and 10" crescent wrench to understand the difference in leverage on a tight, long-neglected lag screw.

Replacing rotted sign posts would be an appropriate activity for a class as would maintaining reassurance markers or removing unnecessary ones, especially in wilderness areas.

If time and there are cairns in need of maintenance or removal, the class could tend to this. Never miss a chance to remove a few rock ducks.

Conclusion

Finally, it is ESSENTIAL to stress that installing signs is not a casual matter. Signs must be level, plumb, and solid in every possible way, or they will fail in a short time, causing trail users and land managers much consternation. Sign work, of course, is not everyone's cup of tea. If it turns out that someone in a class has less than ideal aptitude or interest in such exacting work, suggest to them types of trail work that may be better suited to them. As always, the key is to find the right job for each person.

TRAIL FUN

For a fun wrap-up do a fast-paced "Jeopardy"-style quiz based on the KEY CONCEPTS.

- 1) How deep should a sign post hole be?
- 2) Recite one dimension of clearing limits, why it is that length, and how to measure it without a tape measure. Ask this of three different people.
- 3) What forces must a sign post be able to withstand?
- 4) Why do wilderness junction signs not show mileages?

REFERENCES

Anchoring Trail Markers and Signs in Rocky Areas. 2005. L'Tanga Watson. USDA Forest Service, San Dimas Technology and Development Center. <http://www.fs.fed.us/eng/pubs/pdf/05231202.pdf>

Bureau of Land Management Sign Guidebook. 2004. Denver, Colorado. BLM/WY/AE-05/010+9130. 170 pp. <http://www.blm.gov/pgdata/etc/medialib/blm/wy/signs/docs.Par.61916.File.dat/guidebook.pdf> This only applies to PCT access trails across BLM land.

Lightly on the Land: The SCA Trail Building and Maintenance Manual. 2005. Robert Birkby. The Student Conservation Association and Mountaineers Books. Pages 156-158 discusses signing briefly. See sections of this book at <http://books.google.com/books?id=xD6ThtJNgLkC&printsec=frontcover&dq=Lightly+on+the+Land#>

National Park Service Sign Manual. <http://www.hfc.nps.gov/uniguide/> This only applies to PCT access trails through national parks.

Sign and Poster Guidelines for the Forest Service. U.S. Department of Agriculture; EM-7100-15; 2005. See especially Chapter 5, "Trail Signing" <http://www.fs.fed.us/t-d/pubs/htmlpubs/em7100-15/page28.htm#s512> As the lead agency for the PCT, this is the most important sign manual.

Trail Construction and Maintenance Notebook. 2007. Woody Hesselbarth. USDA Forest Service. See especially chapter on Signs, pp 125-133. <http://www.fhwa.dot.gov/environment/fspubs/07232806/page13.htm> A free copy can be ordered at: <http://www.fhwa.dot.gov/environment/rectrails/trailpub.htm>



PCTA Trail Skills College Curriculum Field Reference



Course 208. Trail Sign Installation & Inventory

STUDENT SKILL OUTCOMES:

- Understand why clear trail signs are important.
- Understand the two important kinds of trail signs: guide signs and reassurance markers, and the standards for each.
- Understand the difference between signs outside and inside wilderness.
- Correctly install the different kinds of signs at trailheads and junctions.
- Learn effective sign post installation.
- Practice paper sign inventory and understand the importance of accuracy.
- Understand the variations in sign design, inventory, and installation among the different land management agencies along the PCT.

KEY TERMS:

Guide Signs: term used by Forest Service Sign Manual to describe trailhead and junction signs that include trail name and/or number, and if outside **Wilderness**, trail destinations and mileages.

Reassurance Markers: (aka blazes, blazers, diamonds, tags, markers) on the PCT these are 3 1/2", 9", 18" plastic triangles or 5 1/2" wood squares (used in wilderness areas) all with the PCT logo imprinted. They are installed north and south of each side trail junction, and occasionally in unclear locations along the trail. On other trails they may be colored diamonds, notches cut in a tree, or painted stripes.

Sign Inventory: a comprehensive list of every sign in a given area that provides the details of sign location, message, and material. In the past they were hand written and stored in notebooks. Today they are more likely entered into a computer and include digital photos as well as text. The US Forest Service includes sign inventory as part of its INFRA and TRACS (TRail Assessment Condition Survey) systems.

Pressure-treated Wood (posts & lumber): (aka PT) round logs and dimensional lumber that has been through an industrial process to penetrate

the wood with chemicals to prevent rot and thereby extend the useful life of the post. For trail work material rated for "ground contact" must be used. Industry standards claim such materials will last 50 years, whereas most untreated wood lasts only 5-10 years in contact with dirt. Some native materials, such as juniper or locust, can last considerably longer because of naturally occurring chemicals in their fibers. Native wood can also be hand-treated (usually only the portion in the ground) with a preservative such as Copper Naphthenate.

Copper Naphthenate: a chemical solution, in 2010, commonly available in hardware stores used to hand treat wood to reduce rot and thus extend the life of wood in contact with soil. Over the years, the chemicals used for wood preservation have changed to reduce potential harmful effects on humans and other organisms. Thus, copper naphthenate may be replaced at some point. Whatever chemical treatment is used, eye and skin protection should be provided and the solution stored, carried, and utilized with caution.

Cairn: (aka ducks or rock ducks) a carefully stacked 3' cone of quality rocks (similar to a rock wall) built only in open rocky areas where the tread is impossible to make distinct. It may have a post built into it to extend its height if late lying snow regularly obscures the trail. "Rock ducks", small piles of rocks, may be used for a short time to clarify new tread, but should be removed as soon as the tread becomes clear. In general and especially in Wilderness, rock ducks are inappropriate and should be removed whenever found.

Right of Way: (aka ROW) the corridor followed by roads and trails across property not owned by the agency responsible for the road or trail. The manager of the trail or road has legal rights and responsibilities for maintaining their facility, but does not own the property. When one ROW crosses another ROW, the authority is ceded to the larger facility. Thus when the PCT crosses a highway, the agency managing the road has the

responsibility for any signing and maintenance inside its ROW. Note: ROW usually extends 10-50' beyond the edge of the road; the larger the roadway the further it likely extends.

Wilderness: with a capital “W” refers to named Federal lands designated by the U.S. Congress under the Wilderness Act of 1964. They may be designated within any category of Federal public land, such as Forest Service, BLM, or Park Service, though management regulations may vary slightly among them. Much of the PCT passes through such Wilderness areas. Most important to trail workers, motorized tools and mechanized transport such as chainsaws, wheel barrows, and bicycles are prohibited, unless a waiver is obtained from land managers (generally not easily granted). Signs in Wilderness intentionally provide less information, to require more skill of their visitors. Group sizes, including volunteer trail crews, are usually limited to no more than 12 people. Heavily used areas such as alpine lakes may have additional regulations such as no campfires. More can be read about the topic of “Minimum Requirements” and “Minimum Tool Analysis” in Wilderness at <http://www.wilderness.net/MRDG/>.

Small “w” wilderness generally refers to any remote area largely undisturbed by motorized vehicles. If not designated by Congress, such areas usually do not limit group sizes or use of mechanized equipment, though may have some interim management restrictions to protect the potential for future designation as Wilderness.

KEY CONCEPTS:

- 1) Safety Documents and Concerns: Personal Protective Equipment (PPE), Job Hazard Analysis (JHA), Tailgate Safety Session (TSS), Emergency Action Plan (EAP)
- 2) Types of Trail Signs:
 - guide
 - reassurance markers
 - Wilderness
- 3) Sign Inventory: Standard forms and digital images
- 4) Sign Installation: pressure-treated versus native posts versus trees
- 5) Specifications:
 - 24” deep
 - 5’ to sign
 - 3’ from trail edge
 - 3/8” lag screws
 - spacers
 - notching
- 6) Reassurance Markers: for trail junctions, road crossings and unclear sections
 - plastic versus wood PCT logo markers
 - mounting locations:
 - trees
 - posts
 - Carsonite
 - rock cairns and ducks
- 7) Sign Maintenance and Ordering
- 8) Report work promptly

Figure 2. The key to solid posts is vigorously tamping the rock and soil with a rockbar, as you fill the hole. Spikes or lag screws can be used at the base of the post to improve anchoring. Top off the hole with mounded soil to accommodate settling and prevent water from puddling around the post. (IMAGE COURTESY OF USFS)

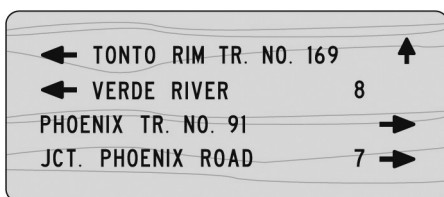


Figure 1. Typical non-Wilderness trail “guide” sign. Wilderness junction guide signs do not indicate mileages. (IMAGE COURTESY OF USFS)

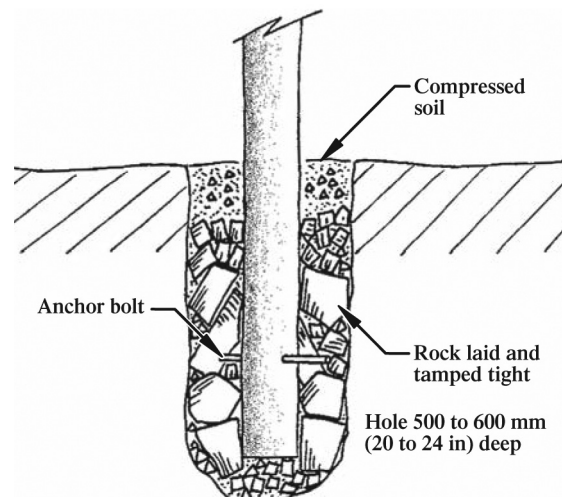
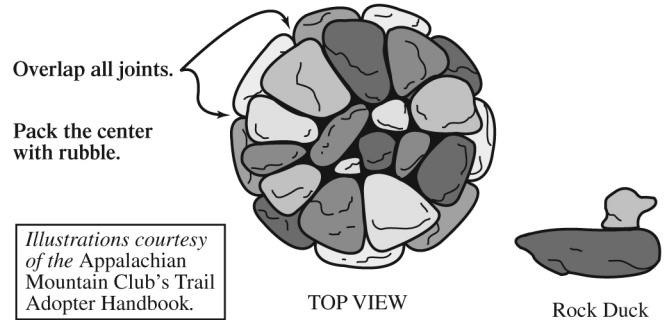
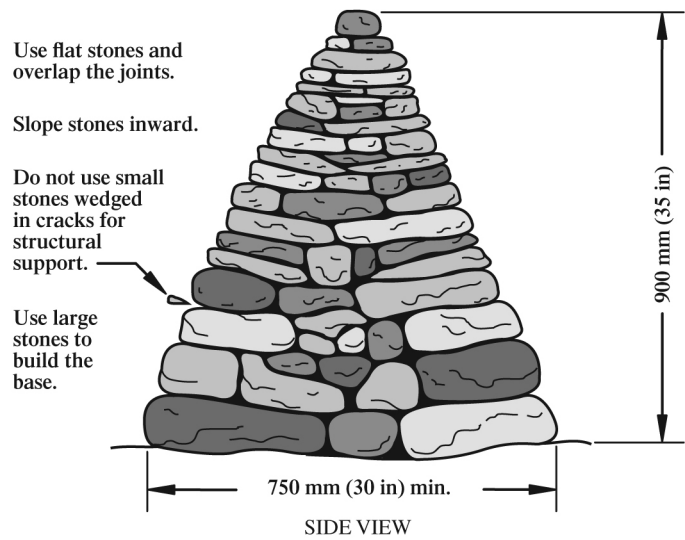


Figure 3. PCT reassurance markers:
9" plastic or metal (top) and 5 1/2" wood
sign for use in Wilderness areas (bottom).



Figure 4. Properly constructed rock cairn to mark a trail.
(IMAGE COURTESY OF USFS)



Note: Wilderness signs would show no mileages, and rarely destinations, rather simply trail names and numbers.

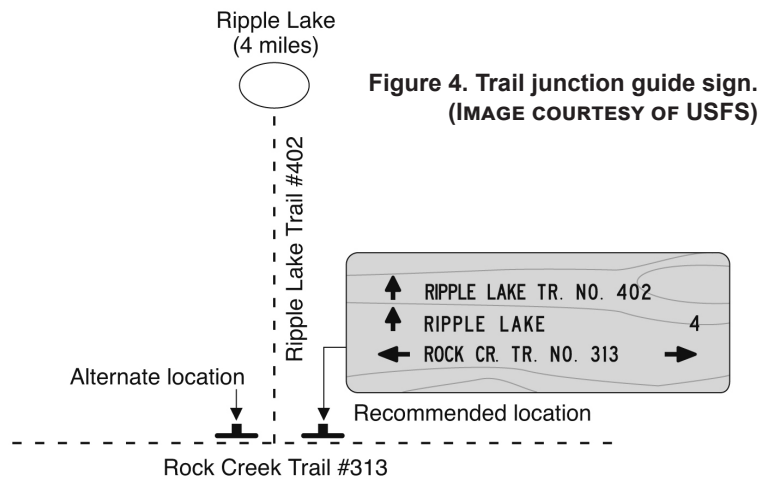
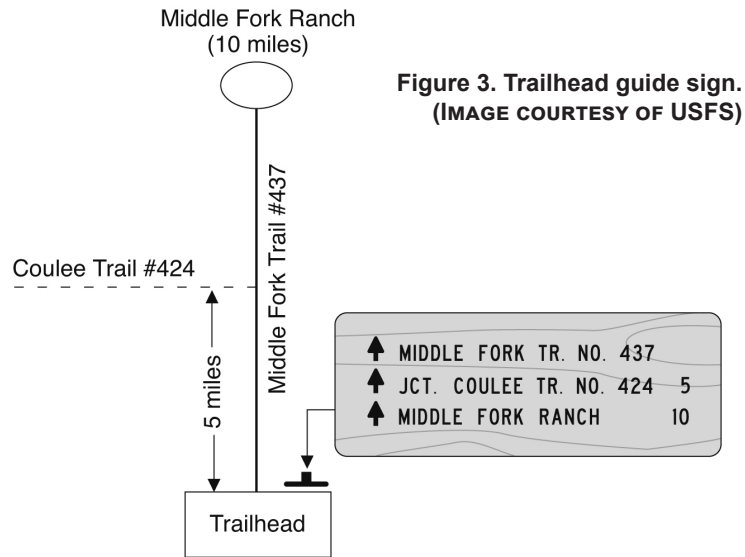


Figure 5. Left “L” trail junction guide sign. (IMAGE COURTESY OF USFS)

