

## Navigation

### Minimum Clubwide Standards: Navigation

#### Application

This standard applies to club sponsored workshops, classes, clinics, seminars, field trips and any other event relating to teaching Navigation skills for the club-recognized Basic Navigation Badge, all referred to herein as the "Wilderness Navigation Course." Courses or other instruction not leading to the Navigation Badge, such as "Beginning Map and Compass" are exempt from these Standards unless they fit into a progression toward the Navigation Badge. Throughout this standard, participants in Courses shall be referred to as either Instructors or Students.

The Basic Navigation Badge is required as a component of certain other Mountaineers courses.

#### Definitions

Wilderness Navigation refers to navigation performed off trail or in the backcountry, and includes navigating in an emergency or in poor conditions when the trail may be obscured or lost. It may include on-trail and front country skills in the progression toward backcountry navigation. Prior to 2015, this was called "Basic Navigation."

Workshop is a tabletop, indoor or sheltered class teaching session. It need not be indoor. It can also include online modules (elearning) and take-home work.

Field trip is an outdoor exercise for teaching and evaluating navigation skills. It can also include online modules and take-home work.

Route is a path to be taken from one point to another. In navigation terms, it includes handrails, baselines or catch lines, compass bearings to follow, coordinates of crucial locations, the time necessary to complete it, elevation gain, distance, features, and so forth.

Route Plan is the plan for said route.

Trip is an entire activity that includes the planning, the travel to and from the activity, the activity itself, and the post-trip analysis or follow-up.

#### Activities and Trips

Any Wilderness Navigation Course generally will be taught in two phases: a "Workshop" activity and an outdoor "Field Trip."

#### Equipment

Students must appear for Field Trips with appropriate clothing and equipment as stated below.

Minimum Compass Standard: In Workshops and Field Trips students must use a compass that includes:

1. ***Adjustable declination:*** A moveable orienting arrow. This is the marking on the bottom of the compass housing, usually represented as an outlined red arrow.
2. A ***transparent base plate*** with an ***index line or direction of travel arrow*** and a ***straight edge*** on at least one side.
3. A ***capsule containing a magnetized needle*** calibrated for North America (A global needle is acceptable).
4. A ***rotating bezel*** marked ***clockwise from 0 to 360 degrees in increments of two degrees*** or less. (Some compasses are numbered counterclockwise. Some are numbered in quadrants of 0-90 degrees per quad. Neither of these are suitable in the Wilderness Navigation course.) In general, bezels should be large to allow use while wearing gloves and the larger size also improves readability and accuracy.
5. ***Meridian lines:*** Parallel marks on the bottom of the interior of the circular housing, or imprinted on the bezel ring itself, which rotate with the bezel when it is turned. The meridian lines run parallel to the north-south axis of the bezel, however turned.
6. A ***ruler and/or scale*** inscribed on one of the straight edges, used for measuring distances.
7. ***An Orienting Arrow.*** A marking on the bottom of the compass housing, usually represented as an outlined red arrow.

Recommended But Not Required Compass Features: A branch or course may require some of these features at their own discretion but the minimum standards are described above.

1. A built in inclinometer.
2. A mirror.
3. A global needle, calibrated for northern and southern hemispheres.
4. Glow in the dark luminescence for visibility in low light.
5. Magnifying lens on the transparent baseplate.
6. A measurement scale for plotting within USGS 1,000 meter grid squares (1:24,000).
7. Any additional measurement scales or rulers.
8. A lanyard.

Field Trip Equipment: Students must bring the items described in the course materials, and the following minimum levels of equipment to the Wilderness Navigation Field Trip as required by course leaders.

Instructor Field Trip Equipment: Instructors **shall have, or have access to the following** to aid in instruction and safety:

- Altimeter or Altimeter App for instruction purposes
- GPS set to UTM and the datum of the map being used, for instruction purposes
- Communication devices for safety and emergency response (Personal Locator Beacon, Satellite Messenger, and/or Cell Phone)

## **Leaders**

Leaders must be approved to lead trips by the sponsoring committee.

## **Participants**

Unless specified by the Chief Course Instructor or Sponsoring Committee there is no prerequisite for taking the Wilderness Navigation Course.

Students attending a Field Trip must be in reasonable physical condition and capable of traveling off-trail.

## **Instructors**

Instructor qualifications are: active Mountaineer membership; current certification in Wilderness Navigation issued by any Mountaineer Branch pursuant to this standard; or permission of the Navigation Committee Chair or Sponsoring Committee.

The Instructor-to-Student ratio for the Workshop or Field Trip should be considered such that adequate instruction, guidance, support, and safety are incorporated into the program. The recommendation for a Field Trip is to have a minimum of two instructors for the activity as a whole, and at least one person (leader, instructor, or participant) who has current Wilderness First Aid certification or similar first aid or medical training.

On any Workshop or Field trip where a youth under 18 is present, the Mountaineers Youth and Family Policy requires at least one Youth Qualified Leader be present on site at all times. See the Mountaineers Youth Policy for more information.

## **Courses**

Mountaineers Branch Committees may offer a Course entitled Wilderness Navigation, plus such other Navigation courses as they find appropriate. Certification in any branch's Wilderness Navigation Course shall be accepted by any Mountaineers branch or activity. Certification is valid for three years and may be renewed by retaking the course or instructing. For this reason, some degree of uniformity among the various branches' Wilderness Navigation courses is appropriate. Any branch's Wilderness Navigation Course shall include a Wilderness Navigation Workshop and a Wilderness Navigation Field Trip. These Workshop and Field Trip topics can be provided through in-person seminars, online computer-based modules, and/or take-home worksheets to complete the full curriculum:

### I. Wilderness Navigation Workshop - Students shall learn:

- Identify items related to topographic maps
  - What is Declination and how does it relate to the difference between magnetic north and true north?
  - What do the colors mean? (black, blue, green, red, brown)
  - Identify the scale of the map and the distance scales
  - Recognize a combination of topographic, area, and man-made features:
    - What are the contour lines, contour interval, and what type of slope do they indicate? (steep, gentle, flat)
    - Identify a ridge, valley, hill/summit, pass, cliff
    - Identify a pass, saddle, or col
    - Identify a valley, gully/draw, or couloir
    - Identify contour trends (up/down) for ridges/spurs compared with valleys/gullies
    - Identify lakes, ponds, tarns, creeks, streams and rivers
    - Identify vegetated vs less-vegetated areas
    - Identify several different types of roads, a railroad, power line, and trail
  
- Identify the parts of a compass
  - Transparent baseplate
  - Capsule
  - Rotating bezel
  - Magnetic needle
  - Orienting arrow
  - Degree markings
  - Index marking or Direction of Travel line
  - Meridian lines
  - Straight edge and measurement markings
  - Declination adjustment
  
- Demonstrate basic procedures for using a compass alone, in a classroom environment (The Field Trip covers more compass procedures).
  - Define what a "bearing" is in the context of a 0 to 360 degree circle.
  - Follow a bearing: Given a bearing measurement toward some object, set the compass to the bearing, sight it, and identify the object to which it points.
  - Take a bearing of an object in your environment and read the bearing from the compass.
  - While taking and following bearings, demonstrate the basic techniques for boxing the arrow, using the direction of travel arrow, turning the whole body, and sighting appropriately for the type of compass (mirrored or un-mirrored).
  
- Demonstrate how to use a compass with the map.
  - Given two points on a map, **measure a bearing** from one point to the other.
  - Given a specific feature on a map, and a bearing to that feature, **plot the bearing** on the map.

- Given one or more of these elements, determine your line and point position on the map:
  - A bearing
  - A UTM coordinate
  - An altitude
  - A topographical feature
- UTM coordinates
  - Plot a UTM position on a map (by estimation and/or using a romer or scale).
  - Understand briefly how UTM relates to or differs from Latitude/Longitude
  - Understand GPS as a source of UTM coordinates and why we use UTM for precision locating on a map
- Plan a Route:
  - Given some information from a route description, plan a route.
  - Identify parts of the route on the map.
  - In planning the route, include techniques to keep you oriented -- handrails, aiming off, and backstop/catchline.

## II. Wilderness Navigation Field Trip - Students shall learn:

Throughout the field trip, demonstrate “Situational Awareness”. Constantly answer the questions, “Where am I?”, “How far is it to my destination”, and “How will I be able to find my way back?”. Follow an ongoing cycle that includes: Observe, Orient, Decide, and Act.

- Relate items in the field to items on topographic maps:
  - Orient the map two ways, with a compass and with terrain association to identifiable features (field trip area dependent).
  - Relate map landmarks to actual landmarks.
  - Relate contour lines, slopes, and elevations to actual terrain.
  - Learn that some variations within a map’s contour interval don’t appear on the map.
  - Relate human-made features on the map with actual features.
  - Relate map distances with actual distances.
- Demonstrate the skills to use a compass in the field.
  - Take bearings on several stationary targets until consistently within  $\pm 3$  degrees.
  - Follow a bearing accurately cross-country as part of a team, using leap-frog and back-bearing (reciprocal) techniques.
  - Follow a bearing accurately cross-country as a solo person using the landmark technique (for safety, a partner may be assigned to follow the same bearing)
  - While shooting and taking bearings, demonstrate proper techniques for boxing the arrow, using the direction of travel arrow, turning the whole body, and sighting appropriately for the type of compass (mirrored or un-mirrored).
  - While following a bearing, get around an obstacle using the 90 degree offset method and resume the line of travel on the other side.

Determine your line and point position (Where am I?) using the map and one or more of these other elements obtained in the field. (Note: Students are not required to have a GPS and altimeter, so any readings with these instruments can be provided by an instructor or trip leader.)

- o A terrain feature
- o An intersection
- o An altitude
- o A man-made feature
- o A bearing of an object and/or a fall line
- o A Universal Transverse Mercator (UTM) coordinate

Plan and Follow a Route:

- o Plan a route through all or part of the field trip area.
- o Follow the route through the field trip area.
- o Learn how route options throughout the field trip can include a handrail, a backstop/catch line, and a turnaround time.

Field Trip Students shall accurately follow one or more bearings on at least one "long navigation problem" that requires traveling cross-country, off-trail, and over terrain that should have a steep section with scree, woods, brush, swamps, or any combination of these characteristics. The distance shall be at least one-third mile (500 meters), exiting the problem within an acceptable range of error from their target bearing. (Two exercises are recommended, one as a solo navigator and one with a partner or team using leap frog techniques.)

Each branch should consider their own safety protocols for their field trips, and incorporate these safety items as necessary. These are recommended, based on past experience.

- o Use of whistles in case of needed immediate attention – lost navigator (panic)
- o Use of two way radios for instructors manning the start/stop and boundary lines
- o Flagging to identify out of bounds areas (handrails)
- o Communication devices for contacting emergency responders (Personal Locator Beacon, Satellite Messenger, Cell Phone)

### **Related Minimum Clubwide Standards**

Climbing Minimum Standards, dated 03-22-2007

Hiking Minimum Standards, dated 03-16-2016

Scrambling Minimum Standards, dated 04-27-2007

Snowshoe Minimum Standards, dated 08-20-2012

Sea Kayaking Minimum Standards, dated 04-20-2016

### **Comparable Standards**

UIAA Standards for Voluntary Leaders and Instructors, Mountain Qualification Labels, Guidance Notes for Member Associations' Training and Assessment Schemes (4th Edition 2016) – UIAA includes navigation knowledge in their Training Standards for Mountain Walking, Trekking, and Snowshoeing as well as their Sport, Rock, Alpine, and Ice Climbing. It is not the

intent for the Mountaineers to achieve a "Mountain Qualification Label" from UIAA. Rather it is one of the only documents from an industry association that references any kind of navigation training standard.

[http://theuiaa.org/documents/safety/MQL-2016\\_Presentation-General\\_final-version2016.pdf](http://theuiaa.org/documents/safety/MQL-2016_Presentation-General_final-version2016.pdf)

They are stated simply as:

- Skills Standard -- "Route finding and navigation through typical and difficult terrain".
- Knowledge Standard -- "Journey planning, route choice, route grades, way marks and guidebooks".

### Revision History

| Version          | Date         | Contributors / Reviewers   | Significant Changes   |
|------------------|--------------|--|---|
| Draft            | Sep 20, 2016 | 2016 Navigation Summit   | First draft distributed from summit.  |
| Issue 1, Draft A | Oct 21, 2016 | Brian Starlin, Patricia McDonald, Bill Ashby, Terri Hoselton, Mike Braun, Jerry Logan, Lynn Graf, Peter Hendrickson, Steve McClure                                 | <ul style="list-style-type: none"> <li>- Removed &lt;3 inch&gt; requirement from compass straight edge length, leaving it open.</li> <li>- Removed &lt;grid north&gt; from declination instruction, leaving only Magnetic and True norths as the minimum.</li> <li>- Changed &lt;follow <b>a</b> bearing&gt; exercise to allow &lt;one <b>or more</b> bearings&gt; and one-third mile instead of one-half.</li> <li>- Removed a more detailed instructor ratio requirement and left it at only 2-minimum. Changed WFA-trained requirement from two to one.</li> <li>- Added a section about the Youth Policy.</li> <li>- Updated Situational Awareness (Second word was Confirm, and now changed to Orient -- Observe, Orient, Decide, Act)</li> <li>- Changed reference link to UIAA Standards.</li> </ul> |
| Issue 1, Draft B | Nov 16, 2016 | Brian Starlin, with feedback from "non-navigation" committee chairs of all branches. This revision was sent to Navigation Committees and experts for final review. | <ul style="list-style-type: none"> <li>- A survey confirmed the importance of Paper Map and Compass for navigation training. Altimeter and GPS are gaining in significance but map and compass are still the foundation and the backup skill when Altimeter and GPS are not working.</li> </ul>   |

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|------------------|--------------|---|--|
|                  |              |   | <ul style="list-style-type: none"> <li>- Added the badge validity period of three years</li> <li>- Clarified UTM plotting to be done via "estimation and/or romer."</li> </ul>   |
| Issue 2, Draft A | Dec 5, 2016  | Brian Starlin, Terri Hoselton, Peter Hendrickson, Brian Carpenter, Bruce Crawford, Wes Rogers, Jerry Logan, Bill Ashby, Bob Boyd, Steve Russell, Jeff Panza, Lynn Graf, Steve McClure, Stefanie Shiller, Dan Greenfield | <ul style="list-style-type: none"> <li>- Grammar - Changed the verbs in the workshop goals to be "learn" rather than "discuss". Reworded some sentences to use Subject, Verb, Object structure. General cleanup.</li> <li>- Included mention of online and take-home components as means to complete the curriculum.</li> </ul>      |
| Issue 2 Final    | Jan 16, 2017 | Brian Starlin, Andy Monts-Homkey, Dennis Miller   | <ul style="list-style-type: none"> <li>- Clarified "number of instructors and WFA training" for field trip. Made it a recommendation instead of a requirement.</li> <li>- Removed specific callout for "whistle" in the field trip equipment. Branches may require a whistle or other safety devices at their discretion.</li> </ul> |
| Issue 3          | Jan 27, 2017 | Brian Starlin, Steve McClure,   | <ul style="list-style-type: none"> <li>- field trip shoot bearings "until consistently within +- 3 degrees" rather than 2 degrees.</li> <li>-</li> </ul>   |
| Issue 4          | Dec 18, 2020 |   |  |

### Items Considered, But Not Included in the Issue 2 Revision

- Youth Protection for Online Navigation Workshop (i.e... avoiding trolling and cyber bullying). This will need to be defined at the club level.
- Seattle Climbing Committee (SCC) requested that Seattle Navigation leave room for flexibility, innovation, and experimentation in these minimum standards. One of many ideas is to create a curriculum that still provides core map and compass knowledge and skills, but also includes more emphasis on using all five tools that are likely to be included in Freedom-9 -- Map, Altimeter, Compass, GPS, and Communication Devices (Personal Locator Beacon). All five tools are not yet included in this standard, because the "minimum" at the moment is Map and Compass. But it is believed that these standards leave room for testing or trialing other curriculums, teaching methods, and course structures, including a combination of online, in-person, and field trip components.