

Recommended Standardized Trail Terminology for Use in Colorado

A

Abutment: A structure at either end of a bridge that supports the superstructure (sill, stringers, trusses, or decks), composed of stone, concrete, brick or timber. (**Pier**)

Access Points: Designated areas and passageways that allow the public to reach a trail from adjacent streets or community facilities.

Accessible: According to ADAAG (Americans with Disabilities Act Accessibility Guidelines), the term “accessible” is used to describe a site, building, facility, or portion thereof that complies with the ADA (American Disabilities Act) guidelines. According to UFAS (Uniform Federal Accessibility Standards), the term “accessible” describes a site, building, facility, or portion thereof that “complies with these standards [UFAS] and ... can be approached, entered, and used by physically disabled people.” (**Wheelchair Accessible, Handicap Accessible, Disabled Access**)

Adopt-A-Trail: A program in which individuals, groups or businesses “adopt” trails, providing volunteer work parties at periodic intervals to help maintain those trails.

Aggregate: Material made up of crushed stone or gravel used as a base course for riprap, asphalt, or concrete pavement. Aggregate is also used in asphalt and concrete mixes.

Alignment: The configuration of a trail in a horizontal plane. The bends, curves and tangents of the path.

All Terrain Vehicle (ATV): Any motorized, off-highway vehicle 50 inches or less in width, having a dry weight of 600 pounds or less that travels on three or more low-pressure tires with a seat designed to be straddled by the operator. Low-pressure tires are 6 inches or more in width and designed for use on wheel rim diameters of 12 inches or less. Manufacturers do not provide a steering wheel, roll bar or seat belt. (**Quad, Four-Wheeler**)

Alternate Line: Intentional design of trails to provide users with options in alternative routes.

Anchor: A large stone that holds other stones and/or soil in place. Also a tree or rock used to hold (anchor) one end of a winch or come-along (horizontal hoist) stationary while it pulls on another object. Also an object, such as a stone, that defines the sides of the trail, helping to keep users in the center of the tread. (**Keystone, Gargoyle, Corral Rock, Corralling, Dragon’s Tooth, Shepherd**)

Angle of Observation: The angle, both vertical and horizontal, between a viewer’s line of sight and the landscape being viewed.

Angle of Repose: The steepest slope angle (measured from the horizon) at which material will rest without moving or sliding down the slope. Loose material would slide across the trail or roll downhill at any steeper angle. For large blocky rocks, the angle of repose will be much higher than for sand or small round rocks.

Apex: The sharpest part of a turn, where the transition from entering to exiting takes place.

Armoring: Reinforcement of a surface with rock, brick, stone, concrete, or other wear resistant “paving” material so as to provide a hardened tread or prevent erosion on a steep slope or in a drainage. May be used to prevent soil loss in steep or soft tread and around roots. The manual, mechanical, or chemical compaction of the trail tread resulting in a hard and flat surface that sheets water effectively and resists the indentations that are created by use. (**Hardening, Flag Stoning, Paving, Stone Pitching, Boulder Causeway**)

Aspect: The particular compass direction a trail or site faces. Aspect affects the amount of solar radiation and year-round moisture to which a site is subjected.

Asphalt: Petroleum-based flexible surface material that provides a smoothly paved surface suitable for bicycles and in-line skates. It is preferred in urban areas where trails are often used for commuting to and from work or school. (**Macadam, Asphaltic Concrete**)

At-Grade Crossing: A trail crossing a roadway on the same elevation. Ideally, a safe at-grade crossing has either light automobile traffic or a traffic signal that can be activated by trail users.

Attractive Nuisance: Something on a trail or greenway that attracts users and that is potentially dangerous to them, such as a mineshaft without a fence around it.

B

Backslope: The excavated slope “in back” or uphill of the trail, rising from the uphill (inside) edge of the tread, and eventually transitioning into native hillside by varying degrees, depending on bank composition and slope stability. (**Cutbank, Backcut, Cutslope**)

Backfill: Material used to refill a ditch or other excavation, or the process of doing this action. The stone or soil material used to fill gaps in trail, step, or wall construction work. (**Infill**)

Backramp: An angled diversion dam or earthen wall leading out of the center of a drainage dip. Serves as a backup to change direction of water flow if needed.

Ballast: Stone, cinders, gravel, or crushed rock fill material used to elevate a railroad bed above the surrounding grade. It drains water away from the ties, spreads the track load over softer subgrade, provides an even bearing for ties, holds ties in place and checks the growth of grass and weeds.

Baluster: One of many vertical pieces between the top and bottom rails of a guardrail.

Bank: The part of the soil next to a stream, lake, or body of water where the soil elevation adjacent to the water is higher than the water level. Also see embankment. (**Stream Bank**)

Barricade: A portable or fixed barrier having object markings, used to close all or a portion of the trail right-of-way to traffic.

Barrier: A structure installed to protect an environmentally sensitive area. A barrier can be hard (fence); live (planted); a combination of hard and live; or a terrain feature (berm). A barrier can be physical (obstructing passage) or psychological (deterring access).

Barrier Free Design: A trail design that promotes the elimination of physical barriers that reduces access to areas by people with disabilities. (**Universal Design**)

Base Course: The layer or layers of specified material of designed thickness placed on a trailbed to support surfacing or be tamped in. (**Foundation**)

Batter: The angle at which an abutment or rock/timber wall is inclined against the earth it retains. The process of sloping the exposed face of a wall back either at a uniform angle or stepping it back uniformly. (**Battering**)

Bed: The primary excavated surface of a trail upon which the tread or finished surface lies. (**Base**)

Bedrock: Solid rock material underlying soils and other earthy surface formations.

Bench: A relatively level section of a hillside, occurring naturally or by excavation.

Bench Cut: A relatively flat, stable surface (tread) on a hillside made by excavation. When excavated it is often referred to as full, half or partial bench to describe the proportions of excavation and fill comprising the trail bed.

Bench Cut, Full: The total width of the trail tread is excavated out of the slope, and the trail tread contains no compacted fill material.

Bench Cut, Half: Half of the width of the trail tread is excavated out of the slope and the downhill (outside) half of the trail tread contains the excavated and compacted material. **(Cut and Fill)**

Bench Cut, Partial: Part of the width of the trail tread is excavated out of the slope, and the rest of the trail tread is made up of fill material. **(Cut and Fill)**

Berm: A raised shoulder or dike along the downhill (outside) edge of the tread. Berms prevent the flow of water across the trail tread, thus causing erosion along the length of the trail tread.

Blaze: A trail marker. Blazes can be carved into a tree with a 2-inch by 6-inch vertical rectangle painted. Plastic or metal triangles or diamonds (known as blazes) with the name of the trail or a directional arrow imprinted can be purchased and nailed to posts to mark a trail route. Nailing onto or scraping away bark to create a blaze is no longer recommended.

Blowdown: Trees toppled over by high winds. See windfall.

Blowout: An area from which soil material has been removed by wind. Such an area appears as a nearly barren, shallow depression with a flat or irregular floor consisting of a resistant layer, an accumulation of pebbles, or wet soil lying just above a water table.

Boardwalk: An elevated, fixed-plank structure, usually built on pilings in areas of wet soil or water to provide dry crossings.

Bollard: A barrier post, usually 30 to 42 inches in height, used to block vehicular traffic at trail access points. Should be installed in odd numbers (one or three). Also an electric light post found alongside trails.

Borrow: Fill material, usually mineral soil or gravel, taken from a site other than the trail tread excavation.

Borrow Pit: A hole dug out of sight of a trail corridor to provide fill material for trail tread construction or trail structures such as turnpikes or rock walls. **(Borrow Site)**

Boulder: A large substrate particle that is larger than cobble.

Bridge: A structure, including supports, erected over a depression (stream, river, chasm, canyon or road) and having a tread or deck for carrying trail traffic.

Bridleway: Public way designed and maintained primarily for equestrian use. Other non-motorized uses may be permitted. **(Bridle Path)**

Brush: Vegetation or small flora.

Brushing: The process of clearing the trail corridor of plants, trees, and branches that could impede the progress of trail users.

Brushing-In: To pile logs, branches, rocks, slash, or duff along the sides of the tread to keep users from widening the trail; or to fill in a closed trail with debris so that it will not be used. **(Obliteration)**

Broadcasting: The process of widely distributing excavated soil, cut branches, and duff as far downhill or uphill and away from the new tread as possible. Widely distributing so as to blend in with the natural soil contours and vegetation and be as inconspicuous as possible.

Buffer: Any type of natural or constructed barrier (trees, shrubs, wooden fences, etc.) used between the trail and adjacent lands to minimize physical or visual impacts. Buffers also provide a transition between adjacent land uses. (**Buffer Zone**)

Bushwhack: Term applied to off-trail hiking (originally where the going was difficult, where many *bushes* had to be *whacked*). Now it is often used to mean off-trail travel regardless of whether the going is difficult or not. Hiking off of established trails can create unwarranted reroutes or ill considered short cuts.

C

Cable Fly Zone: The hazardous area a cable can potentially move to when it comes under tension, or is suddenly released from tension.

Cairn: A constructed pile of rocks located adjacent to a trail used to mark the route in lieu of a blaze. Often used in open or treeless areas where the tread is indistinct or there is no constructed tread. (**Duck**)

Canal: An artificial waterway for transportation or irrigation. Canal and irrigation ditch banks are often used as trails.

Canopy: The leaf cover in a forest stand, consisting of its upper layers.

Cantilever: The portion of a beam or plank extending beyond one or both of its supports.

Capacity: The maximum number of trail users that can pass through a section of trail during a given time period under existing trail conditions. Also refers to the amount of use a given resource can sustain before an irreversible deterioration in the quality of the resource begins to occur. (**Carrying Capacity**)

Capstone: A stone placed in the top or uppermost layer of a structure such as a rock retaining wall or cairn. (**Caprock**)

Centering: Constructing a trail in a manner that encourages traffic to use the center portion of the trail.

Center Line: The proposed or envisioned mid-line of the tread.

Challenge Park: A special-use area that features a variety of challenging technical trail features, generally for mountain bicycle or motorized recreation uses. (**Skills Area, Terrain Park**)

Channel: An area that contains continuously or periodically flowing water that is confined by banks and a streambed. Also used as a verb “to channel” water.

Channelization: The process of changing (usually straightening) the natural path of a waterway.

Characteristic: A distinguishing trait, feature, or quality.

Check Dam: An earthen, stone, or log dam used to slow erosion in a washed-out trail or gully. Recommended primarily for use in trail reclamation or revegetation. (**Sediment Trap, Silt Trap**)

Check Step: A rock or timber step placed in or across the trail tread and designed to act as both a low dam (to slow water flowing down a trail) and as a step for trail users. A retainer bar is usually longer or larger than a check step. (**Retainer Bar**)

Chink: A small fissure or crack; the space between larger rocks used to armor a trail. Also used as a verb: to chink.

Chinking: To fill the crack or space between larger rocks with smaller rocks and soil to stabilize the paving.

Chromated Copper Arsenate (CCA): A wood preservative for boardwalks, decks, and other common trail applications where treated lumber is used. CCA treatment has been banned.

Circle of Danger: The area surrounding a trail worker that is unsafe due to tool use. The inner (or primary) circle of danger is the area the tool can reach while being used. The outer circle of danger is the area the tool could reach if the trail worker lost control or let go of the tool.

Clear-cut: Removal of all trees and shrubs, not just mature growth. (**Clear-Cutting**)

Clearing: Removal of windfall trees, uproots, leaning trees, loose limbs, wood chunks, etc. from both the vertical and horizontal trail corridor.

Clearing Height: The vertical dimension, which must be cleared of all tree branches and other obstructions that would otherwise obstruct movement along the trail. (**Vertical Clearance**)

Clearing Limit: The area over and beside a trail that is cleared of trees, limbs, and other obstructions.

Clearing Width: The outer edges of clearing areas (cleared of trees, limbs, and other obstructions) as specified by trail use.

Climbing Turn: A turn to reverse direction that doesn't have a constructed turning platform or landing. The upper and lower legs of a climbing turn are generally joined by a short section of trail (the apex of the turn) that lies directly in the fall line. As a result, climbing turns located on hillsides with a grade of more than 7 percent can be erosion prone. In a climbing turn, water drains off the outside edge on the entire length of the turn. A thru-cut climbing turn is constructed on a sidehill of 20% or more when measured between the exterior boundaries of the turn, and cuts through the sidehill grade as it changes the direction of the trail 120 to 180 degrees. (**Thru-Cut Climbing Turn**)

Clod: A mass of soil produced by digging, which usually clumps together easily with repeated wetting and drying.

Closure: Designating areas or trails by the appropriate land manager agency where specified trail uses are permanently or temporarily prohibited.

Cobble: Loose rock, with rounded edges, generally 2 ½ inches in diameter used to pave trail tread. Can be further classified as small or large cobble. (**Cobblestone, Baby Heads**)

Collector Ditch: A drainage structure that runs parallel to the trail and intercepts water flowing toward a trail and channels it underneath the trail with a culvert or across the trail. See Parallel Ditching. (**Collection Ditch, Sidehill Ditch**)

Colluvium: Mixed deposits of soil material and rock fragments near the base of steep slopes. Deposits accumulate through soil creep, slides, and local wash.

Compaction: The compression of aggregate, soil, or fill material into a more dense mass by tamping. The degree of soil consolidation that is obtained by tamping with hand tools or, or heavy equipment. (**Compacted, Soil Compaction**)

Concrete: A composition of coarse and fine aggregates, Portland cement, and water, blended to give a hard, unyielding, nearly white pavement, which can be finished to any degree of smoothness. Concrete is most often used in urban areas with anticipated heavy trail use, or in areas susceptible to flooding.

Contour Line: A line on a map connecting points of the land surface having the same elevation. (**Contour**)

Control Point: Places that influence where the trail goes. The beginning and end of a trail are basic control points. Other control points include parking areas, trailheads, structures, slopes for turns, or switchbacks, road or water crossings, and other trails. Positive control points are places where you want users to visit. Negative control points are places you want users to avoid. (**Target**)

Corduroy: A trail tread made of logs laid side-by-side transversely.

Course: A single layer of building material of a uniform height. The material is placed one layer (course) at a time on top of another layer (course) to form a foundation, intermediate layer, or cap layer. Materials laid in courses include bricks, concrete blocks, timbers, stone, and logs. (**Tier, Foundation**)

Critical edge: The rounded outside edge of the trail tread where water travels off the tread and drains onto the native hillslope below. This edge is critical because it is essential to the proper drainage of the trail and prevention of erosion to the tread. **(Outside Edge, Lower Edge, Shoulder, Critical Point, Daylight Edge, Toe)**

Crown: A method of trail construction where the center portion of the tread is raised to allow water to disperse to both sides of the trail. **(Crowning)**

Cross-Country: Hiking or riding across open country rather than on a trail. **(Travel)**

Cross Section: Diagrammatic presentation of a trail profile that is right angles to the centerline at a given location. **(Typical Cross Section)**

Cross Slope: The slope or gradient of the undisturbed hillside; the amount or grade of the pre-existing slope across a trail corridor. **(Side Slope, Side Hill)**

Crosswalk: Any portion of a roadway distinctly indicated for pedestrian crossing by lines or other markings on the surface.

Crusher Fines: Rock fragments ranging in size from dust to a specified size that have been produced by mechanical crushing. For example: ¼- (one quarter minus) indicates crusher fines whose maximum size is ¼ inch. Crusher fines bind well when compacted and are typically used as a tread material, especially on accessible trails. **(Inch-to-Dust, Crushed Granite)**

Culvert: A pipe or box-like construction of native rock, wood, metal, plastic, or concrete that conveys water under a trail without constricting the flow.

Cupped: A board or plank whose edges are higher or lower than the center. Cupping is often found in decks, where the board edges are higher than the middle. Water, trapped in the cupped area, accelerates rot. Cupping also refers to a process of erosion that turns the trail into a gully or the opposite of crowning. Lowering of the center portion of the tread due to user caused erosion or stock traffic, loosening soil in the center of the tread which is then removed by water or kicked off and built up into a berm. **(Cupping)**

Curb: A wood, concrete, or stone component (2 to 8 inches high) built along the edge of a trail or street to form part of a gutter.

Curb Cut: A cut in the curb where a trail crosses a street. The curb cut should be the same width as the trail.

Curvilinear: A free-flowing trail layout pattern characterized by the general absence of straight trail segments allowing for ease of trail user movement.

Cushion Material: Native or imported material, generally placed over rocky sections of unsurfaced trail to provide a usable and maintained travelway.

D

Dam: An embankment or dam made to confine or control water to prevent flooding by the sea, a river/stream, or lake. The embankment is often used as a trail. **(Dike, Groin, Spur, Jetty, Tramway, Tram, Levee, Deflector, Boom)**

Daylighting: Clearing a ditch or drain so that water can run freely, or all the way to “daylight.”

Deadman: A log or logs, heavy timber or timbers, a large block of concrete, a large rock or boulder, or a combination of these materials that is partially or completely buried. Deadmen are used to anchor sections of armored trail, retaining wall, or the end of a winch or come-along chain or cable. See anchor, tie stone, and tie log. **(Deadmen, Facer)**

Deberming: Removing the high ridge of material that has formed along the outer (downhill) edge of a trail, allowing water to once again flow off the side – and not down – the trail.

Decking: The portion of a bridge, puncheon, or corduroy upon which trail traffic will travel. **(Plank Decking, Flooring)**

Ditch: A long, narrow trench or furrow dug in the ground or along the edge of a trail to improve drainage. **(Gutter)**

Dirt Bike: Off-Highway Motorcycle. (OHM)

Dodgeway: A v-shaped stile through fences to allow hikers to pass through.

Drain, Cobble: A cobbled improvement to the trail surface that allows drainage (usually from an intermittent wet seep) across the trail for continued passage along the trail without damage to the soil.

Drain, French: A stone-filled ditch that can have a porous pipe laid along the base to collect the water and carry it away from the site. The top must be kept clear of the surfacing material; allowing water to run freely into the drain.

Drainage: The way in which water flows downhill and/or off the trail.

Drainage, Cross: Running water in wetlands, springs, creeks, drainages, or draws that the trail must cross.

Drainage Dip: A reverse or gradual dip in the grade of the trail, usually 20 to 40 feet long, followed by a gradual rise of 2 to 3 feet with the rise at an angle to the outslope to divert water off the trail. This accomplishes the same effect as a waterbar. An armored or paved dip is a drainage structure paved with stones to enable water to run across a trail without erosion. A reinforced dip is a drainage structure that has a water bar buried under a layer of compacted soil. These structures may be added after initial trail construction. (**Grade Dip, Grade Brake, Drain Dip, Reinforced Drainage Dip, Rolling Dip, Rolling Grade Dip, Spoon Dip, Coweta Dip, Grade Reversal, Kick Out, Diversion Dip**)

Drainage, Sheet: Condition in which water flows in smooth sheets rather than rivulets or channels.

Drainage, Surface: Rain or snow runoff from the surface of the tread.

Drainage Ditch: Open ditches that collect water and carry it away from a site or trail. (**Ditching**)

Drainage Structure: A water diversion structure constructed across the trail tread to remove water flowing down the trail tread or to prevent it from entering the tread.

Dress: To chip or shape a rock finely to fit into a space in a structure.

Driftpin: A 12- to 30-inch steel bar or pipe used to keep logs and timbers in place.

Dry Cement: A gray powder made from limestone that is mixed with sand and water to make mortar, or mixed with sand, small stones or gravel, and water to make dry cement concrete.

Dry Stone: Rock or stonework without mortar or other adhesive.

Drop-off: Slope that falls away steeply.

Duff: Any combination of loose vegetation, vegetable matter, roots, and/or organic laden soil produced by cutting trail. Duff retains moisture and rots away quickly if not removed from trails. This results in the formation of depressions and pockets, which retain water and cause erosion problems. (**Organic Matter, Leaf Litter**)

E

Easement: Grants the right to use a specific portion of land for a specific purpose or purposes. Easements may be limited to a specific period of time or may be granted in perpetuity, or the termination of the easement may be predicated upon the occurrence of a specific event. An easement agreement survives transfer of land ownership and is generally binding upon future owners until it expires on its own terms.

Ecosystem: A system formed by the interaction of living organisms, including people, with their environment. An ecosystem can be of any size, such as a log, pond, field, forest, or the earth's biosphere.

Elevated Tread: Trail tread that is raised above the level of the surrounding ground by the placement and compaction of mineral soil or other material. Elevated tread is similar to a low turnpike and is usually crowned. (**Raised tread**)

Embankment: An artificial deposit of material that is raised above the natural surface of the land and used to contain, divert, or store water, support roads, railways, trails, or for other similar purposes.

Environmental Impact Statement(s) (EIS): A full disclosure, detailed federal report which, pursuant to NEPA law and regulation, establishes the need for the proposed action, identifies alternatives with the potential to meet the identified need, analyzes the anticipated environmental consequences of identified alternatives, and discusses how adverse effects may be mitigated. An EIS is prepared in two stages: a *draft* (DEIS) statement which is made available to the public for review and a *final* (FEIS) statement which is revised on the basis of comments made on the draft statement.

Equestrian: Of horses, horseback riding, riders, and horsemanship.

Erosion: The natural process of wearing down and removing rock and soil by wind, water and traffic.

Exclosure: An area fenced to exclude grazing animals and/or OHV's, usually for protection and study purposes.

Exposure: The relative hazard encountered when on trails and takes into consideration obstacles, alignment, grade, clearing, tread width, tread surface, cross slope, isolation, and proximity to steep slopes or cliffs.

F

Face: The steep exposed side of a slope or rock. Also used to describe the exposed side of a rock in rock structures such as steps. (Facer)

Fall Line: Steepest line across a given contour or the direction water flows down a slope (path of least resistance) under most circumstances.

Fall Zone: The area on either side of or below a technical trail feature that provides a clear landing for a rider who has failed to negotiate the obstacle.

Fault: A fracture in rock along which movement can be demonstrated. A fracture in the earth's crust forming a boundary between rock masses that have shifted.

Fence: A constructed barrier of wood, masonry, stone, wire, or metal, erected to screen or separate areas.

Fill: Material (usually mineral soil and rock) excavated from the trail or a borrow site to fill holes or stabilize rock steps and walls. See Borrow.

Filter: Obvious terrain change to let trail user know that a more difficult section of trail or technical trail feature is ahead. (Qualifier)

Filtration Zone: Material placed in such a way as to act as a filter or cleaning bed to slow down the flow of and filter water.

Flagging: Thin ribbon used for marking during the location, design, construction, or maintenance of a trail project.

Flag Line: A series of pin flags used to mark the intended route for trail construction. Usually placed in trees or on the centerline, inside edge, or critical edge of the proposed trail.

Flow: (Water Flow or Sheet Flow). Water moving in a layer (sheet drainage) or stream (channeling).

Flow: The rhythm or "feel" of a trail. Two basic types include "open and flowing" and "tight and technical".

Flushcut: Branch or sapling cut flush with the trunk or ground.

Footing: The part of a structural foundation that rests on the ground, spreading the weight of the structure and supporting the structure above. Footings are usually concrete. At remote sites the footings may also be mortared stone masonry.

Footpath: A path over which the public has a right-of-way on foot only. Wheelchairs are also permitted, although this may not be practical due to surface or slope.

Fragmentation: Process by which habitats are increasingly subdivided into smaller units resulting in their increased insularity as well as losses of total habitat area. (**Fragmented, Habitat Fragmentation**)

Friction Pile: Post hammered into muck until friction prevents further penetration; foundation for puncheon or boardwalk.

Full Clean: Trail construction where all spoils must be removed vs. “rake down” which allows the spoils to be distributed below or to the side of the trail.

G

Gabion Baskets: Rectangular containers (usually made of heavy galvanized wire) that can be wired together, and then filled with gravel or cobble to make quick retaining walls for erosion control.

Gate: Structure that can be swung, drawn, or lowered to block an entrance or passageway.

Geotextile: A semi-impervious, petrochemical fabric cloth that provides a stable base for the application of soil or gravel. Most commonly used in construction of turnpikes. (**Geo-Synthetic, Geo-Fabric, Filter Fabric**)

Glulamined: A process used to fabricate long beams from short lengths of 2x4, 2.6, or 2x10 lumber. The pieces are placed flat on top of each other with glue spread between them. Lengths are varied so that transverse joints in each layer are not opposite one another. Pressure binds the pieces together. The assembly may be two to four times longer than the longest individual piece of lumber within it. (**Gulams**)

Grade: The vertical distance of ascent or descent of the trail expressed as a percentage of the horizontal distance, commonly measured as a ratio of rise to length or as a percent. For example, a trail that rises 8 vertical feet in 100 horizontal feet has an 8% grade. This is not the same as measuring in degrees. See Rise and Run. (**Percent Slope, Percent of Grade**)

Grade, Average Trail or Segment: The average steepness of a trail over its entire length or a certain trail segment. (**Overall Trail Grade**)

Grade, Maximum Sustainable: The steepest acceptable grade permitted on any part or segment of a trail or over the majority of the trail length. (**Sustained Grade**)

Grade Reversal: A reverse in the trail grade – usually a short dip followed by a rise – that forces water off the trail. Grade reversals are subtle and typically designed into the alignment of the trail. When designed into the alignment they can prevent the need for more artificial water diversion structures such as rolling dips. (**Grade Change, Adverse Pitch**)

Grade-Separated Crossing: Overpasses or tunnels that allow trail users to cross a railroad right-of-way or street at a different level than trains or traffic.

Gravel: Rock fragments ranging from 1/5 to 3 inches in diameter.

Grubbing: Removal of roots, stumps, rocks, soil, etc., from the trail tread and corridor.

Guardrail: A 36- to 42-inch railing at the edge of a deck, bridge, stairway, or boardwalk to prevent people from falling. Horizontal or diagonal structural member which is attached to vertical posts for the purpose of delineating trails, protecting vegetation, providing safety barriers for trail users at overlooks, and assisting users when crossing bridges or using steps. (**Handrail, Railing**)

H

Habitat: A place that supports a plant or animal population because it supplies that organism’s basic requirements of food, water, shelter, living space, and security.

Hazard Tree: Tree or limb that is either dead, or has some structural fault, that is hanging over, or leaning towards the trail or sites where people congregate. (**Danger Tree, Widow Maker**)

Header: (Stone or Rock). A long, uniform stone laid with its narrow end towards the face of a retaining wall or crib used intermittently to structurally tie in the other rocks laid in the wall. See Tie Stone.

Headwall: A support structure at the entrance to a culvert or other drainage structure.

Helical Pier or Pile: Steel post with auger-shaped bit-end that is screwed into wet soils either by hand, or with the aid of specialized hydraulic tools to establish a foundation for puncheon or boardwalk.

Hewing: Using an ax or adze to cut a log so that its cross section is a square or rectangular.

Humus: The well-decomposed, more or less stable part of the organic matter in mineral soils.

Hybrid: A trail design that blends “open and flowing” and “tight and technical” features.

Hybrid Trail Construction: Concept where an agency uses a combination of trail contracting and volunteers to construct a trail.

I

Impermeable Material: A soil or material whose properties prevent movement of water.

Impervious Surface: Hard surfaces that do not allow absorption of water into the soil and that increase runoff. Examples of such surfaces include concrete or asphalt paved trails and parking areas.

Inslope: Where the tread is sloped downward toward the backslope of the trail. An inslope drain causes water to run along the inside (uphill) edge of the trail.

Inside Turns: On a trail traversing a hillside, concave, or naturally banked turns in which the sideslope helps direct trail riders around the turn.

Invert: The bottom inside surface of a pipe, ditch, or culvert over which water flows.

J

Joist: Usually a wooden 2x6, 2x8, 2x10, or 2x12, with the 2-inch dimension resting on a sill or ledger, toe nailed into place, supporting a floor or deck.

Joist Hanger: A steel angle or strap nailed to the side of a ledger and shaped to hold a joist. After the joist hanger is installed, the joist is placed within the hanger and the two are nailed together.

L

Land Management Agency: Any agency or organization that manages public lands—many managed as recreation and/or wilderness areas. Examples include federal agencies such as the US Forest Service, the National Park Service, and the Bureau of Land Management; state, county, and local park system agencies; as well as The Nature Conservancy.

Landing: The transition area on a switchback. (**Apron, Deck**)

Landslide: Dislodged rock or earth that has slipped downhill under the influence of gravity and obstructs passage on a trail.

Ledger: A horizontal piece of wood attached to, and supported by, piles or concrete or stone masonry piers. Ledgers support stringers or tread timbers.

Lifts: Layers of loose soil. Used to specify how much loose soil should be laid down at a time before it must be compacted or wrapped in geotextile fabric.

Load, Dead: The total physical weight of a bridge or structure, equal to the combined weight of all structural components.

Load, Design: The maximum weight a trail tread or structure can carry at any point along its length. Service and emergency vehicles need to be considered when determining the design load of trails and structures.

Logged Out Tree: Down tree across the trail with sections already removed to permit passage.

M

Machine Built: Trail or feature constructed with the use of an excavator, trail dozer, or other piece of equipment.

Maintenance: Repair, improvements or other work done on or near a trail to improve the safety and sustainability of the trail, correct any original design defects or otherwise improve usability of the trail.

Maintainer: A volunteer who maintains a section of trail as part of a trail-maintenance program of a trail organization.

Mineral Soil: A soil comprised of rock fragments, sand and smaller sized particles, and free of organic matter. Mineral soil is typically buried under layers of surface organic matter (duff). Mineral soil is relatively stable and is the preferred material upon which to build a trail tread. When compacted carefully, mineral soil also provides good support to rock walls and other trail structures.

Minimum Clear Width: The narrowest point on a trail; created when significant obstacles, such as utility poles or tree roots, protrude into and reduce the design width.

Minor Field Adjustments: Deviations of the trail alignment made during the course of normal construction or maintenance as determined by the supervisor or crew leader, and not part of an original survey.

Mitigate: Actions taken to avoid, minimize, reduce, eliminate, or rectify the adverse impact from erosion, management practice or the impacts of trail users. (**Mitigation**)

Monitor(ing): Check systematically or scrutinize for the purpose of collecting specific data along a trail in relation to a set of standards to determine whether progress is being made in achieving management objectives or goals.

Mono-wall: A short wall of one or two courses of rock, timbers or other material on the lower edge of the tread used to maintain the tread in place, usually when full bench construction is not possible.

Mortar: A mixture of sand, lime, Portland cement, and water that is used in masonry construction to bind bricks, concrete blocks, or stone to form structural elements such as retaining walls and piers. Mortar may also be used when constructing rip rap.

Mountain Bike: Designed for trail riding and characterized by upright handlebars, heavy-duty brakes, wide tires, and low gearing. They are used for both recreational and competitive bicycling.

Mulch: Organic matter spread on newly constructed trail work to help stabilize soils and protect them from erosion. Examples include bark chips or shredded wood fiber.

Multi-Tier Wall: A wall constructed of several layers of stone, usually drystack, with one layer laid on top of the layer below and usually offset or battered to ensure sustainability of the structure. Multi-tiered walls are usually used to retain soil and fill material where cross slope and tread stability may be lost due to erosion.

N

Nailer: A strip of wood attached to a stringer that tread planks are nailed or screwed to.

National Recreation Trail (NRT): Existing trails that provide a variety of outdoor recreation uses in or reasonably accessible to urban areas (over 800) recognized by the federal government (Secretary of Interior or Secretary of Agriculture, not Congressional action) as contributing to the National Trails System.

National Scenic Trail (NST): Federally designated extended trails (over 100 miles in length), which provide for the maximum outdoor recreation potential and for the conservation and enjoyment of the significant scenic, historic, natural, or cultural qualities of the areas through which they pass. The Appalachian and the Pacific Crest Trails were the first to be designated as National Scenic Trails in 1968.

National Trails System: A network of trails (National Scenic, Historic, or Recreation) throughout the country authorized by the 1968 National Trails System Act (16 U.S.C. 1241-51).

National Trails System Act (NSTA): Was passed as Public Law 90-543, signed by President Johnson on October 2, 1968, after several years of negotiations. It has been amended more than 20 times since.

Non-motorized: Trail recreation by modes such as bicycle, pedestrian, equestrian, skate, ski, etc.

Noxious Weeds: Plant species designated by Federal and State law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or non-native, new, or not common to the United States.

O

Off-Highway Vehicle (OHV): A motorized vehicle designed for use off paved roads intended for travel in areas normally considered inaccessible to conventional highway vehicles. OHV's do not generally meet federal equipment and emissions standards, but do have to comply with special noise standards. (**Dirt Bikes, Dune Buggy, ATV, Four-Wheel Drive Vehicles, 4WD, Mule, UTV**)

Open and Flowing: A type of trail design that allows for sweeping turns, higher speeds, and longer sight lines. Primarily applies to bicycling and motorized traffic.

Organic Soil: Soil that is made up of leaves, needles, plants, roots, bark, and other organic material in various stages of decay, and that has a large water/mass absorption ratio. Generally the first (outermost) layer of soil.

Outfall: The drainage channel of a drainage dip, water bar, reinforced drainage dip, or switchback drainage trench. Water exits the structure through the outfall. (**Outlet, Outflow Channel, Outwash**)

Outside Turns: Convex or off-camber turns (usually on trails that traverse hillsides) that are more difficult to navigate, as centrifugal force pulls trail riders to the outside of the turn. Turns in which the ground slopes toward the outside, making it harder to keep (wheeled) traction as speed increases. (**Off-Camber**)

Outslope: The downward grade from the backslope (inside or uphill edge) of the tread to the critical edge (outside or downhill) edge of the trail tread. (**Cant, Camber**)

Overpass: A crossing of two highways or a highway and a trail or railroad at different levels where clearance for traffic on the lower level is obtained by elevating the higher level.

P

Parallel Ditching: A lateral drainage ditch constructed adjacent to the trail tread to catch surface water sheeting from the tread surface and divert it away from the trail. Generally this drainage system is utilized in low flat areas or areas where multiple entrenched trails have developed. See Collector Ditch.

Passing Space: A section of trail wide enough to allow two users to pass one another or travel abreast. (See Turnout)

Passing Space Interval: The distance between passing spaces.

Pavement: That part of a trail having a constructed hard paved surface for the facilitation of wheeled trail traffic.

Pile: A timber, pipe, or metal pole, or cast in place concrete, or metal to serve as a support for a bridge or boardwalk. The pile is either placed in a hole dug to the depth required (end bearing pile), driven with a heavy weight (friction pile), or screwed into the ground by a machine (helical pile). (**Piling**)

Pilot Hole: A small hole drilled in wood or steel to guide a nail, screw, or drill bit.

Pin Flags: Wire wands with square plastic flags at one end for field layout and marking of new trail, maintenance work, or relocations of trail sections.

Pinning: Driving drift pins through a log or timber into a log or timber, or into the ground.

Pitch: An increase in the prevailing grade of a trail, used during construction to avoid an obstacle, to catch up with the intended grade, or to meet a control point.

Pitch, Maximum: The highest percent of grade on a trail.

Pitch, Maximum Sustained: The highest percent of grade on a trail that is sustained for a significant distance.

Plan and Profile Sheets: Drawings (usually prepared for trail construction) used to record horizontal and vertical geometry of a trail alignment as well as other required improvements to the trail corridor.

Planimetric map: A map that shows features such as roads, trails, and mountains, but does not show contour lines of elevation changes.

Plank Run: Usually wood planks laid lengthwise on top of bridge decking used as the tread surface. (**Running**)

Plumb: A line or plane perpendicular to the Earth's surface.

Project Construction Notes: Notes and drawings written by a Technical Advisor, Trail Designer, or agency personnel for a project and used to inform Crew Leaders and their crew of specific tasks to be completed on the project. The notes usually provide technical information by section. The tasks to be done in the section are noted specifically by the linear footage or station, measured from a common starting point for the project.

Pruning: The removal of normal vegetation that intrudes into a trail corridor.

Puncheon: A log or timber structure built on the ground for the purpose of crossing a boggy area. Usually consists of sills, stringers, decking, and often a soil or loose gravel tread laid on top of the decking. (**Bog Bridge**)

Q

Quadrangle: A tract of land represented by one US Geological Survey map sheet.

R

Rail Corridor: The path of a railroad right-of-way, including the tracks and a specified tract of land on either side of the tracks (generally one hundred feet wide).

Rail-Trail: A multi-purpose, public path or trail (paved or natural) created along an inactive railroad corridor. (**Rail-to-Trail**)

Railbank(ing): Retaining a rail corridor for future railroad uses after service has been discontinued. The National Trails System Act, Sec. 8d, provides for *interim public use* of the corridor, allowing the establishment of recreational trails.

Rake Down: Trail construction where all spoils are distributed below or to the side of the trail vs. "full clean" where all spoils must be removed.

Ramp: A sloped transition between two elevation levels. One of the three main elements of a drainage dip. It catches water running down the trail and directs it off. (**Apron**)

Read(ing): To study the terrain and obstacles to determine a course or possible locations for a trail through the area.

Rebar: Steel-reinforcing rod that comes in a variety of diameters, useful in fabricating pins or other trail anchors.

Reclamation: The process of restoring a denuded and/or eroded area to close to its original condition with soil and vegetation. Clumps of native turf or sod removed from areas of new trail are often reused for revegetation and closure of disturbed areas. To restore a site to its previous state so that it appears untouched by human use. (**Rehabilitation, Rehab, Revegetation, Restoration, Naturalize**)

Reconnaissance: Scouting out alternative trail locations prior to the final trail route location being selected. (**Recon**)

Reconstruct: To replace or rebuild a trail or trail structure (switchback, waterbar, bridge, etc.) that is no longer safe to use or in poor condition. Also can include all work to bring an existing trail up to its classification standard, including necessary relocation of minor portions of the trail. (**Reconstruction, Renovate**)

Recreational Trails Program (RTP): Federal program providing funds to the States for motorized and non-motorized trails and trail related projects, based on non-highway recreational fuel use. (www.fhwa.dot.gov/environment/rectrails)

Register, Trail: Along long-distance trails or at a trailhead you may find “trail registers” that allow users the chance to make comments to those behind them, and read comments from those ahead. Registers can be an important safety measure for land management agency staff to pinpoint the location of trail users.

Registration, Trail: A survey form filled out and left at a trailhead drop box or office that allows managers to obtain trail use information. Or a required permit to use trail.

Reroute: A new section of trail that replaces an existing section. Rerouting is often the best remedy for a poorly designed trail that requires frequent maintenance.

Retaining Wall: A structure used to prevent soil from slumping, sliding, or falling, usually made of log or stone. Often used to provide stability and strength to the edge of a trail. (**Crib Wall, Revetment, Cribbing**)

Right-of-Way: A linear corridor of land held in fee simple title, or as an easement over another’s land, for use as a public utility (highway, road, railroad, trail, utilities, etc.) for a public purpose. Usually includes a designated amount of land on either side that serves as a buffer for adjacent land uses. See Easement.

Riparian: A habitat that is strongly influenced by water and that occurs adjacent to streams, shorelines and wetlands. The land and vegetation immediately adjacent to a body of water. (**Riparian Zone**)

Rip Rap: Rough, large stones or rocks placed across an outfall or downslope, along the bank of a watercourse, or other appropriate areas used to dissipate the energy of flowing water retarding erosion. Also used to prevent soil from slumping, sliding, or falling.

Rise and Run: A measurement of grades expressed as a proportion of the amount of vertical rise in a given horizontal run. For example, “1:4” means that the grade or slope rises one unit for each four units of horizontal run. Taking this one step further, 1:4 is a 25% grade or slope, where 25% is obtained by dividing 1 by 4 and expressing the result as a percentage. See Grade.

Road: A vehicle route that has been improved and maintained by mechanical means to ensure relatively regular and continuous use. A way maintained solely by the passage of vehicles does not constitute a road.

Road Base: A mixture of sand, clay, and gravel commonly used underneath asphalt on paved roads and trails. For trails, this material can be compacted into a fairly hard surface, yet it remains soft enough to be comfortable for trail users.

Road-crossing: Intersection of trail and road traffic-maybe the most dangerous parts of a trail since they are sometimes located on ridge tops, blind hills, or hairpin turns.

Road-to-Trail Conversion: Involves narrowing an old logging road to provide a meandering trail with a solid trail tread for users.

Root: The part of a plant/tree, usually underground, that anchors the plant/tree. Can be a hazard to trail users when they protrude through the tread surface.

Root Ball: Earth and soil that is lifted up when a tree and its roots fall over. **(Rootwad)**

Route: A traveled way, a means of access, a line of travel, an established or selected course of travel.

Rubble: Rough, irregular fragments of broken rock or concrete.

Rubble Wall: A roughly built wall or structure of irregular or greatly differing sizes of stone usually laid at or nearly at the same angle as the cross slope; frequently used to discourage shortcutting corners and to armor native slopes to prevent erosion.

Runoff: Water (not absorbed by the soil) that flows over the land surface and ultimately reaches streams.

Running Joint: A vertical joint or seam, which is continuous through two or more courses in a wall. Running joints weaken a wall and should be avoided.

Runout: A section of trail, usually at or near the base or bottom of a descent, that provides adequate length and grade reduction in order for the user to safely slow, stop or negotiate turns, intersections or structures. **(Outrun)**

Rut(s): Sunken tracks or grooves in the tread surface cut in the direction of travel by the passage of water or trail users. **(Entrenchment)**

S

Saddle Notch: A half-circle notch cut in the bottom of a log to fit over a log in the course below.

Scale: The proportionate size relationship between an object and the surroundings in which the object is placed. The relationship of the length between two points as shown on a map and the distance between the same two points on the Earth.

Scour (Scouring): Soil erosion through the force of moving water.

Scree: Gravel-size loose rock debris, especially on a steep slope or at the base of a cliff, formed as a result of disintegration largely by weathering. **(Scree Slope)**

Screening: Full or partial concealment of unsightly views to render them unnoticeable from the trail, by means of natural objects, plantings, fences, or other appropriate means.

Sediment: Soil that has been removed from its place of origin by erosion and re-deposited in a different area down-slope or down-stream.

Sedimentation: Deposition of soil particles or other material carried in water, usually the result of a reduction in water velocity below the point at which the material remains in suspension.

Sediment Basin: A natural or constructed bowl or basin to catch or slow water run-off to allow the sediment to settle out of suspension. **(Catch Basin)**

Seep: A saturated zone at or near the ground surface where voids in the rock or soil are filled with water at greater than atmospheric pressure. Seep or spring sites are typically characterized by riparian vegetation and soil formed in the presence of water. Water may or may not be discharging from these sites, depending on the underlying geology, water source, season, or long term climatic trends. **(Seepage, Spring)**

Segment: A portion of a trail. Changes in geographic features, jurisdiction and/or political boundaries often distinguish segments (passages). (**Passage**)

Setting Bed: A layer of aggregate (either crushed stone or crushed gravel), mason's sand, or mortar placed on solid rock, or a compacted subgrade of existing ground or fill as a base for a row of stone or block. Depending on the setting bed, material, and subsurface conditions, the setting bed may be from 4 to 12 inches deep.

Shear: Force parallel to a surface as opposed to directly on the surface. An example of shear would be the tractive force that removes particles from a trail as flow moves over the surface of the slope.

Sheetwash: The widespread removal of surface debris by the steady and continuous flow of water on low gradient slopes. Generally at slow speeds and over long periods.

Shim(s): A short, thin wedge of wood or metal used to fill a space. Used to bring a ledger, stringer, or tread to level. Also used as a verb: to shim. Stone chip or fragment; to break up into chips or fragments (spall). Shims or spalls are wedged between stones that have been placed without mortar. (**Spall(s), Wedging**)

Shoulder: The side or edge of a rock or trail. The paved portion of a highway, which is contiguous to the travel lanes, allowing motor vehicle use in emergencies. They can also be specialized use by pedestrians and bicyclists.

Shrink-Swell Potential: The susceptibility to soil to change in volume due to a loss or gain in moisture content. A shrink-swell potential is typically associated with soils that have a high percentage of clay.

Shrub: A woody plant that usually remains low and produces shoots or trunks from the base; it is not usually tree-like or single stemmed.

Shy Distance: The distance between the trail edge and any fixed object capable of injuring someone using the trail.

Sidehilling: Process of excavating or cutting a bench across the slope.

Sidewalk: A paved strip (typically concrete four feet in width) which runs parallel to vehicular traffic and is separated from the road surface by at least a curb and gutter. Sidewalks are common in urban areas and in some suburban residential areas.

Sight Distance: The distance a trail user can clearly and safely observe the trail ahead or behind. (**Sight Line**)

Sign: A board, post, or placard that displays written, symbolic, tactile, or pictorial information about the trail or surrounding area. Signage increases safety and comfort on trails. There are five basic types of signs: Cautionary, Directional, Interpretive, Objective, and Regulatory. (**Signage**)

Sill: Stone or timber supports that keep bridge, boardwalk or puncheon stringers from contacting the ground. A horizontal log or timber laid in a shallow trench to support a plank or log. (**Sleeper**)

Silting-in: The filling in of a drainage structure or low segment of the trail tread by sediment settling out due to improper design or construction or because of infrequent maintenance. (**Sand or Soil Puddle**)

Silt Fence: Temporary sediment barrier consisting of filter fabric, sometimes backed with wire mesh, attached to supporting posts and partially buried.

Skirt: To construct a trail around a mountain, often at an even grade, instead of climbing over the mountain.

Slash: The branches, bark, tops, cull logs, and broken or uprooted trees left on the ground after a windfall/blowdown or through logging and trail construction. See Windfall and Blowdown.

Slope: The natural or man made pitch of the land, as shown on contour maps. Generally refers to the hillside (land), not the trail, as trail "slope" is called the grade.

Slope, Cut: The exposed ground surface resulting from the excavation of material on the natural terrain. (See backslope.)

Slope, Fill: The exposed ground surface resulting from the placement of excavated material on the natural terrain.

Slope, Running: The average slope of a contiguous section that is in the same direction as the trail; measured by averaging the values of slope measurements taken periodically at different points along the trail.

Slope, Running Cross: The average cross slope of a contiguous section of a trail; measured by averaging the values of cross slope measurements taken periodically at different points along a given section of trail.

Slope Stability: The resistance of a natural or artificial slope or other inclined surface to failure by mass movement.

Slough (pronounced “Sluff”): Material removed from the backslope by erosion or other means that have been deposited on the trail tread. Silt and debris collecting on the uphill (inside) edge of a trail tread. Slough may raise the height of the tread relative to the original level and result in water pooling on the trail or be sufficient to block the trail. **(Slide)**

Slump: When the trail tread material has moved downward causing a dip in the trail grade. **(Slumping)**

Snag: Any standing dead, partially dead, or defective (cull) tree at least 10 inches in diameter at breast height and at least 6 feet tall.

Sod: Plugs, squares, or strips of turf with the adhering soil.

Soil(s): The surface material (mineral materials, organic matter, water and air) of the continents, produced by disintegration of rocks, plants and animals and the biological action of bacteria, earthworms and other decomposers. The four fundamental groups of soils are: gravels, sands, loams and clays.

Soil Cement: A mixture of pulverized soil combined with measured amounts of dry cement and water and compacted to a high density. As the cementing action occurs through hydration, a hard, durable semi-rigid material is formed. It must have a seal coat to keep out moisture and a surface that will withstand wear. **(Cement-Treated Base)**

Soil Map: A map showing the kinds of soil types and their boundaries in all the detail significant to soil use and management.

Soil Stabilization: Measures that protect soil from the erosive forces of raindrop impact and flowing water. They include, but are not limited to, vegetative establishment, mulching, and the application of soil stabilizers to the trail tread.

Soil Stabilizer: Material, either natural or manufactured, used to hold soil in place and prevent erosion due to water, gravity, or trail users. Stabilizers include soil cement, geogrid, etc.

Square Notch: A notch cut in a log to fit snugly against a square notch cut in another log, the square cut end of another log, or a plank. The portion of the notch in contact with the other log is cut as a flat, uniform plane. The ends or ends of the square notch are perpendicular to the flat plane.

Stakes, Grade or Slope: Temporary stakes set by the trail locator to establish the elevation and cross section of the completed tread.

Stakes, Line: Temporary stakes set by the trail locator to establish the line of the trail.

Station: One hundred feet or other measurement along the line of the trail or road; used in surveying and construction.

Step: Structure (stone or wood) that provides a stable vertical rise on the trail, usually in sets.

Stepping Stone: Large rocks set in boggy areas or shallow stream crossings to provide passage for hikers.

Step, Pinned: Step held in place on a ledge or a rock slab by steel pins set in holes drilled in the rock.

Stile: A ramp, step or set of steps for hikers to pass over a fence or wall without allowing livestock to escape. See Dodgeway.

Stock: Riding and/or pack animals (horses, mules, llamas, burros, etc.) used to ride and/or carry equipment and provisions on a trail. Both commercial pack stock and individual stock are included. Usually horses and mules, but also llamas or goats. Commercial stock in area of trail can be cattle grazing. **(Recreational Stock, Pack Stock)**

Stone: Rock or rock fragments put to human use.

Stone(s), Stepping: Large rocks set in boggy areas or shallow stream crossings to provide passage for hikers.

Straw Bale: Temporary barriers made from bales of straw that are sometimes installed across a slope or around the perimeter of a construction site to intercept and detain sediment transported by runoff.

Stream Crossing: A natural water-level stream crossing, which can consist of improvements (stepping stones, aggregate mix, asphalt or concrete) to provide a level, low velocity surface for trail traffic. **(Ford)**

Streambed: The unvegetated portion of a channel boundary below the baseflow water level. The channel through which a natural stream of water runs or used to run, as a dry streambed.

Stringer(s): The lengthwise members of a structure placed parallel with the centerline of the tread, usually resting on sills, which spans wet areas and supports the decking.

Structure: Anything constructed or erected that requires location on the ground such as a bridge, wall, steps, etc. on or near a trail.

Stub: Projecting (and hazardous) piece of a branch, root, or sapling not cut flush with the trunk or ground. **(Stob)**

Sub-base: On paved trails the sub-base lies between the sub-grade and the trail surface, and serves as a secondary, built foundation for the trail surface (concrete or asphalt). The purpose of the sub-base is to transfer and distribute the weight from the trail surface to the sub-grade. The sub-base consists of four- to six-inches of graded aggregate, which provides bearing strength and improves drainage.

Sub-grade: The native soil mass that makes up the primary foundation of the trail that supports the tread surface. Topography, soils, and drainage are the key factors comprising the sub-grade.

Subsoil: The soil below the surface soil in which roots normally grow. It has been carried over from early days when “soil” was conceived only as the plowed soil and that under it as the “subsoil.”

Substrate: Underlying layer of loose/soft material below topsoil and overlying bedrock. The composition of a streambed, including either mineral or organic materials.

Subsurface Drainage: Rainfall that is not evapotranspired or does not become surface runoff.

Super-Elevated: Slope or bank of a curve or climbing turn expressed as the ratio of feet of vertical rise per foot of horizontal distance. The outside edge of a trail is raised or banked for the purpose of overcoming the force causing a vehicle (bicycle or OHV) to skid when maintaining speed in a curve. **(Super Elevation, Bermed, Banked)**

Surface: Material on top of the trailbed or base course that provides the desired tread. It can lessen compaction of soil, provide a dry surface for users, and prevent potential erosion and abrasion. In addition to concrete and asphalt, trails can be surfaced with dirt, rock, gravel, sand, mud, snow, grass, and other substances. **(Surfaced, Surfacing)**

Suspension Bridge: A bridge that has its treadway suspended from two or more cables securely anchored at the ends.

Sustainable: Community use of natural resources in a way that does not jeopardize the ability of future generations to live and prosper.

Swale: A linear low-lying natural topographic drainage feature running downhill and crossing the trail alignment in which sheet drainage would collect and form a temporary water course. A low-lying ground drainage structure (resembling a swale) can be constructed to enhance drainage across the trail. Like a drainage dip, a swale is used to shed water off a trail and is a useful remedy for wet spots on relatively flat trails. **(Drain, Knick)**

SWECO Trail Dozer: Sutter Welding and Equipment Company builds the 450 and 480 trail dozers specifically for trail construction and maintenance. The dozers are 40” wide by about 11’ long and 6’ high. They weigh about 8,000 pounds, are powered by turbo diesel engines, and have hydraulic controls with full hydrostatic drive. The 6-way floating blade and rock rippers allow for the removal of most rock and roots from the trail bet, leaving a smooth and sustainable finished trail surface.

Switchback: A sustainable turn on a hillside which doubles back or “switches back” on itself. The trail is routed onto a level landing or deck where it makes a transition to the opposite direction. The lower leg of a switchback is outsloped but the upper leg is insloped to drain water run-off out the end of the turn. Switchbacks were originally designed to allow railroads to carry traffic up steep, difficult terrain. They were called switchbacks because the rails included a switch to allow the trains to “switch back” on themselves.

Switchback, Rolling Crown: A sustainable turn on a hillside engineered for drainage. The trail is routed onto a crowned landing or deck where it makes a transition to the opposite direction. The upper approach is insloped to drain water out the back of the landing and the lower approach is outsloped;

T

Tackifier: Material sprayed onto a soil surface to bind soil particles and prevent erosion.

Talus (talus slope): Large rock debris on a slope or at the base of a hill or cliff. The rocks are larger and have sharper edges than those found on scree slopes.

Tamping: Using a machine compactor, a tamping bar, or another tool to compact earth.

Technical: A section along a trail that is difficult to navigate; used to describe challenging sections of trail.

Technical Trail Feature (TTF): An obstacle on the trail requiring negotiation, the feature can be either built or natural, such as an elevated bridge or a rock face respectively.

Texture, Soil: Relative proportions of the various size groups of individual soil grains in a mass of soil. Specifically, it refers to the proportions of clay, silt, and sand in soil.

Tie Log: Structural member notched into the horizontal facer and wing walls used to secure the facer and wings by utilizing the mass of the backfill. See Deadman and Anchor.

Tie Stone: A header or keystone that spans the breadth of the trail tread. See Deadman and Anchor.

Toenail(ing): Joining two pieces of wood by driving nails at an angle to the surface of one piece and into the second piece.

Topographic Map: Maps that indicate built and natural features (buildings, roads, ravines, rivers, etc.) as well as elevation changes and land cover. United States Geological Survey maps are available from many government offices, outdoor shops, and map stores; or from digitized versions on the Internet. **(Topo, USGS Topographic, Contour Map)**

Track: Mark left by something that has passed along; footprint or wheel rut. A pair of parallel metal rails on which trains run.

Track Tie Memory: On rail-trails the removed railroad cross ties can leave an imprint (or memory). To remove this “memory” the ballast needs to be graded and compacted before laying a trail surface.

Trail: A designated route on land or water with public access for recreation or transportation purposes such as walking, jogging, motorcycling, hiking, bicycling, ATViing, horseback riding, mountain biking, canoeing, kayaking, and backpacking. A path typically indicates the common route, temporary or permanent, taken by pedestrians between two locations. **(Path, Pathway)**

Trail, Access: Any trail that connects the main trail to a town, road, or another trail system.

Trail, Backcountry: A primitive trail (can be open to motorized or nonmotorized users) in an area where there are no maintained roads or permanent buildings.

Trail, Balloon: A trail that starts along a linear route and then branches out to a loop.

Trail, Bike: Any corridor that is physically separated from motorized vehicle traffic by an open space or barrier. It is either within the highway right-of-way or within an independent right-of-way. Due to lack of pedestrian facilities, most bike trails are commonly designed and referenced as multi-use trails.

Trail, Braided: Undesirable multiple parallel paths created by users walking around muddy spots or other obstacles in the original trail.

Trail, Connecting or Side: Provide additional points of access to other trails.

Trail, Contour: A trail constructed or exists such that it follows a contour, with its elevation remaining constant. A trail that traverses a hillside and is constructed to drain water without causing erosion of the trail. (**Sidehill Trail**)

Trail, Crowned: A trail bed built up from the surrounding area and sloped for drainage (usually by excavating trenches parallel to the trail).

Trail /Road, Designated: Specific roads and trails identified by the land management agencies where some type of use (motorized or nonmotorized) is appropriate and allowed either seasonally or yearlong and which have been inventoried and mapped and are appropriately signed on the ground.

Trail, Destination: A trail that connects two distinct points (A to B) rather than returning the user to the original beginning point.

Trail, Directional Use: A trail laid out in such a way as to encourage users to travel in one direction. (**One-Way**)

Trail, Doubletrack: A trail that allows for two users to travel side by side, or to pass without one user having to yield the trail. Doubletrack track trails are often old forest roads.

Trail, Extended: Trails over 100 miles in length (as defined in the National Trails System Act).

Trail, Fall Line: Trail constructed on the fall line (direction water flows down a hill) which encourages water to run down the trail.

Trail, Feeder: A trail designed to connect local facilities, neighborhoods, campgrounds, etc. to a main trail.

Trail, Flat: A type of trail built across level terrain. The terrain is without a pronounced cross slope and has inefficient or unpredictable drainage. Techniques for flat trail include elevated tread or a system of channels to improve trail drainage.

Trail, Frontcountry: Less emphasis is put on minimizing contact with signs of the civilized world. The main objective is to provide enjoyable trail experiences within the vicinity of developed areas by utilizing the scenic and interpretative features of semi-urban, rural, and natural environments.

Trail, Greenway: A trail established along a natural corridor, such as a river, stream, ridgeline, rail trail, canal, or other route for conservation, recreation, or alternative transportation purposes. Greenway Trails can connect parks, nature preserves, cultural facilities, and historic sites with business and residential areas. (**Urban Trail**)

Trail, Hard Surface: A trail tread surfaced with asphalt, concrete, soil cement, or other hard, stabilized material. (**Paved**)

Trail, Interpretive: Short to moderate length trail (1/2 to 1 mile) with primary function of providing an opportunity to walk or paddle and study interesting or unusual plants or natural features at user's pleasure. The ideal nature trail has a story to tell. It unifies the various features or elements along the trail into a related theme. (**Nature Trail**)

Trail, Linear: Trails that start and return exactly along the same route and have a beginning and an end. (**Out-and-Back Trail**)

Trail, Long Distance: In general a trail best characterized by length (more than 50 miles), linearity (follows a linear feature), and diversity (geographic and political).

Trail, Loop(ed): Trail or trail systems designed so that the routes are closed circuits connecting a number of points of interest, giving users the option of not traveling the same section of trail more than once on a trip.

Trail, Multiple-Use: A trail that permits more than one user group at a time (equestrian, OHVer, hiker, mountain bicyclist, etc.).
(Multi-Use, Diversified Use, Shared Use)

Trail, Natural Surface: A tread made from clearing and grading the native soil, and with no added surfacing materials.

Trail, Open and Flowing: A type of trail design that provides tempo and rhythm by incorporating sweeping turns, higher speeds, passing zones, and better sight lines.

Trail, Primary: Continuous through route that originates at a trailhead. Primarily for directing users through an area while promoting a certain type of experience.

Trail, Recreation: A trail that is designed to provide a recreational experience.

Trail, Regional: An extended or longer trail that may cross one or more land management agency jurisdictions and connects diverse trail systems. (Example: The Colorado Front Range Trail)

Trail, Rolling Contour: A trail characterized by gentle grade, grade reversals, and outsloped tread.

Trail, Secondary: Short trail used to connect primary trails or branchings of primary trails. They encourage movement between two primary trails or facilitate dispersal of use through secondary branching.

Trail, Side: Dead-end trail that accesses features near the main trail.

Trail, Spine: A regional trail that acts as a “backbone” to a regional trail system.

Trail, Single-Use: One that is designed and constructed for only one intended use (i.e. hiking only).

Trail, Single-Track: A trail so narrow that users must generally travel in a single file.

Trail, Social: See Trail, Undesignated.

Trail, Soft Surface: An unsurfaced natural trail or a trail surfaced with compacted earth, crusher fines, bark, or gravel.

Trail, Pack: A trail used by recreational or commercial stock. (Stock Trail, Stock Driveway)

Trail, Spur: A trail that leads from primary, secondary, or spine trails to points of user interests—overlooks, campsites, etc.

Trail, Stacked Loop: Trail or trail systems designed with many loops “stacked” on each other, giving users the option of not traveling the same section of trail more than once on a trip.

Trail, Sustainable Natural Surface: A trail that supports currently planned and potential future uses with minimal impact and negligible soil loss while allowing the naturally occurring plant systems to inhabit the area, recognizing required pruning and eventual removal of certain plants over time. The sustainable trail will require little rerouting and minimal maintenance over extended periods of time.

Trail, Tight & Technical: Section along a trail that is filled with obstacles such as rocks, roots, logs, sharp turns, and steep grades, making it difficult to navigate and putting a premium on (motorcycle or mountain bike) riding skills.

Trail, Undesignated: Any unofficial trail resulting from trail users simply hiking away from or off the established trail and trampling vegetation. Undesignated trails may be the result of shortcutting and can be dangerous, eroded, and unsustainable.
(Social Trail, User or Visitor Created Trail, Wildcat Way, Informal)

Trail, Undulating: One that follows a wavelike course, often going in and out of gullies.

Trail, Water: A recreational waterway on lake, river, or ocean between specific points, containing access points and day use and/or camping sites for the nonmotorized boating public. (**River Trail, Canoe Trail**)

Trail Corridor: The full dimensions of the trail, including the area on either side of the tread and the space overhead that need to be cleared of brush and obstacles. The area of passage of the trail, including all cleared and managed parts above, below and adjacent to the tread.

Trail Design: Designing and layout of trails requires special training, knowledge, experience, and skill. When designing trails, many different factors are taken into account including hydrology, topography, soils, flora, fauna, management objectives, user expectations and characteristics, and trail design standards. The designer will utilize data collected from area site analysis, environmental assessments, public meetings, and area trail and management plans.

Trail Design Standards: The specific values selected from the trail design criteria become the design standards for a given trail project. These standards will be identified and documented by the designer. Trail standards will relate to the trail physical characteristics, users, location, and environmental factors.

Trail Log: An inventory of physical features along or adjacent to a trail. An item-by-item, foot-by-foot record of trail features and structures and the improvements needed on a specific trail.

Trail Management Objective Sheet: Written form delineating the goals and objectives pertaining to a specific trail management project (maintenance, reroute, bridges, etc.). Usually intended to provide guidance for a trail crew leader. See also Project Construction Notes and Trail Log.

Trail Specifications: Written standards of work and type of materials to which trails (tread, clearing, grade) and trail structures (bridge, culvert, puncheon) are built and maintained according to use type.

Trail Survey: A physical field assessment of the trail or proposed trail, to determine alignment, maintenance tasks, hazards, impact, etc., prior to work, or as part of ongoing trail maintenance. (**Condition Survey**)

Trail System(s): A collection of individual trails that may or may not be connected to one another, whereby each retains its distinctiveness, and yet belongs to the system by association with a federal, state, local, or bioregional context.

Trailbed: The finished surface on which base course or surfacing may be constructed. For trails without surfacing, the trailbed is the tread.

Trailhead: An access point to a trail or trail system that can be accompanied by various public facilities, including hitching posts for horses, on OHV unloading dock, toilets, water, directional and informational signs, and a trail-use register.

Trample: To tread heavily so as to bruise, crush, or injure; refers to the process of vegetation being destroyed by trail users. (**Trampling**)

Traverse: To cross a slope horizontally by going gradually up and across in lieu of the more direct up-and-over (up the fall line) approach.

Tread: The surface portion of a trail upon which users travel. (**Treadway**)

Tread Creep: When the loose soil of the trail tread moves (sags or slides) downhill during use causing users to walk on the lower edge.

Tread Width: The width of the portion of the trail used for travel. The width specification that a trail was designed to meet, generally considered part of the trail (the beaten path or tread width). (**Design Tread Width**)

Tree Line: The farthest limit, either in altitude on a mountain, or the farthest north in the northern hemisphere, in which trees are able to grow. Beyond this line, the environment is too harsh for trees to survive. (**Timber Line**)

Trench: Badly eroded trail in which the user travels in a ditch that may be knee deep or deeper. Also, during the construction of a drainage dip, the trench is a drainage channel constructed at an angle across the tread to move water off the trail.

Trestle: Mid-span support for a bridge.

Trio Maintenance: Three-step function of removing slough, berm, and brush. Also called fire line trail maintenance.

Turnout: A place where the trail is widened to permit trail traffic traveling in opposite directions to pass. (**Passing Space**)

Turnpike: A trail building technique that uses a combination of gravel, soil, or other filler material held in place by rocks or logs on either side to make the tread higher than the surrounding water table. Useful in low-lying areas with poor drainage. (**Causeway**)

U

Underpass: A crossing of two highways or a highway and a trail or railroad at different levels where clearance to traffic on the upper level is obtained by depressing the lower level of such a crossing.

Understory: All forest vegetation growing under the canopy or upper layers of forest vegetation.

Urban: Places within boundaries set by state and local officials having a population of 5,000 or more.

Utility Terrain Vehicle (UTV): Off Highway Vehicle that exceeds the established width of an All Terrain Vehicle (ATV). Typically includes a side-by-side seating arrangement, roll cage and a steering wheel as opposed to a handlebar. Term also known as Recreational Utility Vehicle (**RUV**). (**Mule, Side-by-Side, Dune Buggy**)

V

Viewshed: The landscape that can be directly seen under favorable atmospheric conditions from a viewpoint or along a trail corridor.

W

Walkway: An area for general pedestrian use (other than a sidewalk or path) such as courtyards, plazas, and pedestrian malls.

Warp: Severe bend in a piece of lumber or timber making it unusable in its original length. Sometimes the warp occurs mostly at one point, usually a knot, and short usable pieces can be cut on either side of that point.

Wash: Removal or erosion of soil by the action of moving water. The dry bed of a stream, particularly a watercourse associated with arid environments and characterized by large, high-energy discharges with high bed-material load transport.

Washout: Erosion of a relatively soft surface, such as a trail, by a sudden gush of water, as from a downpour or floods. A channel produced by such erosion.

Waterbar: A hardened structure (rock, timber or log) located across the tread to divert water abruptly from the trail tread. This type of drainage structure is no longer recommended for construction or use on trails. See Drainage Dip.

Waterfall: Sudden, near vertical descent of water from a height as it flows over rock or a steep embankment.

Waterlogged: A soil condition in which both large and small pore spaces are filled with water. The soil may be intermittently waterlogged because of a fluctuating water table or it may be waterlogged for short periods after rain.

Wattles: Stems and branches of rootable plant material (willow, dogwood, and alder, for example) that are tied together in long bundles, placed in shallow trenches on contour, and staked down to stabilize erodible slopes. (**Fascines**)

Wayside(s): Site(s) along a trail that allows users a place to stop to sit, rest, eat, enjoy a view, or read an informational display. They can be located where there are noteworthy natural or cultural resources, attractive views, or a lack of other nearby facilities. (**Turnout**)

Weephole: Opening left in a retaining wall (revetment, cribbing) to allow groundwater drainage.

Wetland(s): Lowland areas, such as marshes or bogs that are saturated with water, creating unique habitat for plants and animals. **(Bog, Swamp, Peat Bog)**

Wheel guard: Small logs or poles placed along the edges of a bridge or puncheon decking designed to help define the edge of the structure and prevent damage to the edges of the decking material by trail users. Also to help keep vehicles, wheelchairs, stock, etc. from running off the edge of the structure. **(Curb Edge, Bull Rail)**

Wilderness Area: Uninhabited and undeveloped federal land to which Congress has granted special status and protection under authority of the Wilderness Act of 1964. Allows foot and horse traffic only; no mountain bikes, OHV use, hang gliders, or other “machines.”

Wildland(s): Ecologically healthy lands that are in their original natural state.

Winching: Attaching a winch to a nearby tree or large rock and using a rope or chain to pull a vehicle through an otherwise impassable area or to remove large rock or trees during trail work or construction.

Windfall: Anything (trees, limbs, brush, etc.) blown down on the trail by the wind. See Blowdown. **(Deadfall, Downfall, Wildthrow)**

Wing: Angled barriers at a bridge approach used to channel traffic and prevent trail users from inadvertently plunging over embankment.

Wing Wall: A structural component of a retaining wall, which is interlocked with the facer or front of the wall. The wing generally intersects with the facer at a 45° angle, but may be at an angle between 1 and 90°. This component is anchored by tie logs and both assist the facer in retaining the fill material, and helps prevent flanking.

Z

Zero-Mile Mark: The point at which a measured trail starts.

Tool Descriptions and Uses Handout

Knowing what a tool is designed for is important. The following tool descriptions contain usage and safety concerns for each tool. Safe and proper tool usage cannot be overemphasized.

Always be on the lookout for crewmembers using tools improperly. If a crewmember is using the wrong tool for the job, it can lead to overexertion and increase the potential for an accident or broken or damaged tools. You need to be sure that the right tool is being used for the job.

Common examples of tool misuse are:

- Using a shovel to pry rocks instead of a rock bar
- Using the axe blade of a Pulaski to break up soil
- Using the grubbing end of a Pulaski to pry up big roots and rocks
- Using an Adze hoe to cut larger vegetation, such as tree roots
- Chipping or prying rocks with a McLeod
- Cutting into dirt or rock with a bow saw
- Chipping rock without safety glasses
- Throwing a tool

When you see these things happening, politely instruct the crewmember how to use the tool safely. Always keep in mind – safety first!

Tools for Measuring

Clinometers: A clinometer is a simple instrument for measuring grades. Most clinometers have two scales, one indicating percent of slope, the other showing degrees. Percent slope, the relationship between the amount of elevational rise or drop over a horizontal distance, is the most commonly used measure. Don't confuse percent and degree readings. It is easy to do! Expressed as an equation:

$$\text{Percent of Grade} = \frac{\text{Rise}}{\text{Run}} \times 100 \text{ percent}$$

A section of trail 30 m (100 ft) long with 3 m (10 ft) of elevation difference would be a 10 percent grade.

Levels: A device for establishing a true horizontal line or plane by means of an bubble in a liquid that shows adjustment to the horizontal by movement to the center of a slightly bowed glass tube. Carpentry and construction levels, line levels, and laser levels are different types of levels that can be used for construction of fencing, stone walls, boardwalks, and bridges. Levels also help to determine the slope of trail tread.

Abney Level: Hand-held instrument that is adjusted like a sextant and can be set to a fixed gradient. The user sights through the Abney to a fixed reference (usually a second person) until the crosshair bisects the bubble; this indicates the preset grade.

Global Positioning System (GPS) Receiver: A hand-held, battery powered device used to determine the location (latitude and longitude and/or meridian) and altitude using a network of global positioning satellites.

Measuring Wheel: A device that records the revolutions of a wheel and hence the distance traveled by rolling the wheel over a trail or land surface. (**Cyclometer**)

Other Measuring Devices: The tilt of the handle on an upright McLeod can be used to measure outslope of tread. A partially filled, clear water bottle can be used as a level. Pulaski's are useful as measuring gauges since the handles are exactly 3 feet long and most heads are 1 foot from end to end. Get a tape measure that has metric units. Another good idea is to mark off commonly used measurements on your tools. Know the length of your feet, arms, fingers, and other handy rulers as a ready reference on the trail. Get to know the length of your pace over a known course so you can easily estimate longer distances.

Tools for Cutting, Sawing and Brushing

Bow Saws: Bow saws come in many sizes and consist of a tubular steel frame designed to hold a sharp and deeply toothed steel blade. Blade lengths can vary from 16 to 36 inches.

Bark Spud: A tool with a 1- to 4-foot long wood handle and a dished blade used to remove bark from logs by sliding between the bark and the wood.

Bush Hook: A long handle and either double- or single- edged curved blade gives the bush hook a powerful cut.

Chain Saw: A portable gas-operated saw with an endless chain carrying cutting teeth.

Cross Cut Saws: A crosscut saw is a large saw intended for cutting through downed timber. This type of saw should be used with wedges to hold the kerf (cut) open to prevent the log being cut from sagging and pinching the saw. The crosscut saw has two handles connected by a long steel saw blade. This saw requires two people to use it. Correctly pushing the saw in sync and at the same speed, while your partner pulls allows the saw to work to it's full potential. After a few pulls, a smooth rhythm may be obtained. Crosscut saws are another tool that takes practice and experience to use safely and effectively and may require certification.

Draw Knife: A tool with a sharp blade and handles at both ends used to strip bark from small diameter logs. **(Raw Knife)**

Froe: An old hand tool used originally for splitting shingles and shakes. It consists of a heavy, 12-inch-long, straight steel blade with a wooden handle. The cutting edge of the blade is placed against the wood to be cut and a club or mallet is used to hit the face.

Lopping and Pruning Shears: Lopping and pruning shears are similar in design and use. However, lopping shears have longer handles to improve reach and increase leverage for cutting thicker stems. Handles on lopping shears range from 26 to 36 inches long, and should be used on live limbs approximately 1 inch diameter or smaller. Pruning shears have shorter handles and should be used on small branches with diameter of approximately 3/8 of an inch. A good rule of thumb is not to cut anything bigger than your thumb. Use a bow saw for limbs larger than 1 inch in diameter.

Machete: A large knife used to clear succulent vegetation.

Pole Saw: A pruning saw with a telescoping handle to trim branches that would otherwise be out of arm's reach. Some models have built-in loppers that can be operated from the ground with a rope. **(Tree Pruner)**

Pruning Saws: Single handled, straight bladed pruning saws are useful for limbing, some brushing, and removing small downfall; especially where space is limited and cutting is difficult. Folding pruning saws are handy.

Swedish Safety Brush Axe: A machete-like tool with a protected short, replaceable blade and a 28-inch handle used to cut through springy hardwood stems. **(Sandvik)**

Timber Carrier: A tool, with a long handle and hooks, which allows two people on each side of the carrier to transport logs or timber.

Weed Cutters: Weed cutters are used for cutting light growth like grasses and annual plants that grow along trails. They are lightweight and durable and usually swing like a golf club. Tool with a serrated blade at the end of a wooden handle. **(Grass Whips, Weed Whip, Swizzle Stick, Swing Blade)**

Tools for Pounding and Hammering

Hammers: A variety of hammers may be used on projects. Sledgehammers or “double jacks” should be used carefully. They are used to drive spikes or to break rocks or concrete. Carry sledges by your side, by gripping the handle near the head. Nail or claw hammers have heads with heat-treated steel faces for driving nails, and claws on the other end for pulling nails. Three and four pound sledges (“single jacks”) are used with a rock chisel for shaping stone. Carry the hammer by gripping it near the head, holding the tool away from your body as you walk. Protective glasses must be worn when using hammers, especially a sledge with a chisel. Claw hammers are for driving nails only and should never be used with a rock chisel.

Single-Jack Hammer: A short handled hammer with a 3- to 4-pound head. Can be used alone to drive timber spikes, or with a star drill to punch holes in rock.

Sledgehammer: A long handled heavy hammer with a 6- to 8-pound head, usually held with both hands.

Star Drill: A foot-long tool, weighing about a pound, used with a single-jack hammer to punch holes in rock or open a seam/crack.

Tools for Lifting and Hauling

Austin Rock Sling: An Austin rock sling is a carrying device made of steel chain configured in a web pattern with rope or steel ring handles. It is generally used to transport large rock for use in walls or other structures. Several Austins used together can be utilized to move large logs and beams for bridges or turnpikes.

Brewery Blanket: A brewery blanket is a heavy nylon blanket generally 6 to 8 feet square and originally used in the filtering process at a brewery. It is useful for transporting duff, soil, and rocks. For heavy loads, a brewery blanket can be knotted at the corners or a golf ball sized rock wrapped in each corner of the blanket to provide the volunteers with a better handhold.

Buckets: Usually a five-gallon plastic container with a heavy wire handle (bail) useful for transporting soil, duff, and small hand tools.

Cable, Wire: A thick, heavy rope, made of wire strands.

Cable Gripper: A device that clamps onto a cable when tension is applied to the attachment point.

Cable Rigging: Cable works and hoists used to lift and move large, heavy rock or logs.

Cable Strap: A pre-cut length of wire rope (that may have eyes on both ends), that is used in rigging applications.

Cant Hooks and Peaveys: Cant hooks and peaveys afford leverage for moving or rotating logs. To roll a heavy log, use a series of short bites with the hook and maintain your progress by quickly resetting it. Catch the log with the hook hanging on top of the log. Rotate the log using the leverage of the handle, working the tool like a ratchet. Moving large logs may require several hooks working together. Avoid taking large bites; a heavy log will roll back and pin the handle before the hook can be reset.

Canvas Bags: The canvas bag or coal sack is a large heavy canvas tote bag with two handles that can be used to carry large volumes of light material such as duff, needles, or leaves. It has the same capacity as about two full buckets.

Clevis: A U-shaped metal piece with holes in each end through which a pin or bolt is run. Used to attach two objects together.
(Shackle)

Griphoist: A brand name for a manually operated hoist that pulls in a cable at one end and expels it from the other end; used to move rock or timber needed for trail structures.

J-Straps: Nylon loop straps attached to a shoulder pad are used to carry rock bars comfortably by transferring the weight to a shoulder.

Log Carriers: Log carriers enable teams of workers to move logs. The tool hooks the log, allowing persons on either side of the handle to drag it. Several carriers could allow four or more persons to carry a large log.

Ratchet Winches or Come-Alongs: Hand operated winch. Ratchet winches (also called come-alongs) are useful for pulling stumps and for moving large rocks and logs. These winches offer mechanical advantage – the Grip Hoist is a specialized winching system that provides a mechanical advantage of 30:1 or more.

Rope: A large stout cord of strands of fibers or wire twisted or braided together.

- **Working End:** The end of the rope being used at the time to tie a knot.
- **Standing Part:** The part of the rope not being used at the moment.
- **Bight:** A curve or bend in the rope. This is usually a loop through which the working end is passed.

Skyline: Rigging system with a highline by which a load is moved via a pulley, pulled by a separate rope.

Slackline: Rigging system with a highline, which is lowered to pick up a load, then tightened to move the load.

Snatch Block: Pulley with hinged side plate allowing attachment anywhere along a fixed rope.

Tumpline: A strap slung over the forehead, to anchor a backpack.

Wheelbarrows: Wheeled tub used to transport loose materials.

Winch: Applicable to a broad array of devices that use a drum, driven by a handle and gears, around which a cable is wound, to provide mechanical advantage for moving heavy objects.

Wire Cable: A thick, heavy rope made of wire strands.

Zipline: Rigging system with a taut, stationary wire rope highline for moving loads on a movable pulley.

Tools for Chopping and Grubbing

Adze Hoe: The modern adze hoe has a forged steel head with a large, almost flat blade set at a 90-degree angle to a three foot wooden or fiberglass handle. The head is “friction fitted” to a bent “adze style” handle. You use an adze hoe to chip or break up clumps of soil when constructing new trail or outslowing an existing tread.

Altimeter: An instrument for measuring altitude.

Axes: Axes are of two basic types – single or double bit. Single-bit axes have a cutting edge opposite a flat face. Double-bit axes have two symmetrically opposed cutting edges. One edge is maintained at razor sharpness and the other is usually somewhat duller as result of chopping around rocks or dirt.

Cutter Mattock: A cutter mattock has a broad mattock blade, but also a short stout axe or cutter blade in place of the pick point.

Fire Rake: A tool with triangular tines used to cut duff and debris from firebreaks or trail corridors.

McLeods: The McLeod combines a heavy-duty rake with a large, sturdy hoe. The hoe edge of the McLeod is about 9 ¾ inches wide and the head is 11 inches at its widest point. The head can be used for tamping soil or crusher fines. The McLeod is also useful as a slope gauge. When planted standing upright on a trail tread, the tilt of the handle will indicate the slope of the tread. You can clearly see whether the trail is insloped or outslowed.

Pick Mattock: A pick mattock has a broad adze or mattock blade instead of the clay point. The mattock blade is good for working in most soils and may be used to cut roots or chop clumps of grass.

Railroad Pick: The modern railroad pick is a heavy digging tool with a stout forged steelhead. The head has an “eye” or socket for a handle and two points. The “chisel” or “clay” point is flat and used to work hard packed clay soil. The point is tapered and is a good tool to use for general digging in rocky soil.

Pulaskis: The Pulaski combines an axe and an adze hoe in one multi-purpose tool. The tool is named for Edward Pulaski, circa 1910, a Forest Service Ranger and part-time blacksmith. He developed the tool especially for firefighting purposes.

Rakes: Lightweight rakes are usually used for smoothing and leveling surfaces, for spreading and seeding.

Tools for Digging and Scooping

Digging-Tamping Bar: A long bar with a small blade at one end for loosening compacted or rocky soil and a flattened end for tamping.

Rockbars: Mild steel bars, 6 feet long and designed with a chisel tip for loosening dirt or prying rocks and a pointed end for prying or a tamping end for compacting soil.

Soil Auger: T-shaped tool with a spiral tip for turning into soil to probe its content.

Shovels: Shovel blades are either square-edged for scooping or pointed for digging, with either a wooden or fiberglass handle that can vary from three feet to five feet long.

Tools for Personal Protection

Clothing: Long sleeved shirts and long pants are suggested clothing when working and may actually be required by some agencies. Shorts are not recommended.

Dust Masks: Dust masks can be used for some types of rockwork and in extremely dusty conditions.

Ear Protection: Ear protection is needed when working near most motorized equipment and working in any environment with loud, repetitive noises such as chipping rock with a manual jackhammer.

Footwear: Sturdy shoes or boots are preferred due to the rugged terrain associated with trail or outdoor work. They are necessary to protect the feet from glancing tools, loose rock, dense vegetation, and cactus and provide good footing when working.

Gaiters: Coverings that zip or snap around the ankles and lower legs to keep debris and water out of your boots. (**Leggings, Puttees**)

Gloves: Work gloves are necessary to protect the hands from blisters, thorny brush, poison ivy, or any other minor scratches associated with outdoor work. Gloves also help with gripping tools.

Hardhat: A hard shell worn on the head as protection during trail work. Hardhats are an agency requirement for many types of work, especially when working in timber or when there is a chance of being hit on the head and risk of head injury.

Safety Goggles or Glasses: Eye protection is important for any type of work whether digging, cutting, sharpening, sawing, chipping rock or for when there is a chance of something getting into your eyes.

Safety Harness: A body belt or strap usually made of nylon, for use while working near steep drop-offs. Must be of approved construction and design, and in good repair, and attached to a secure anchor point with carabiners and approved climbing rope.

Sheath: Protective covering made of leather or plastic used to cover sharp blades of tools while in storage or when the tools are transported.