Arrowman Conservation School

Level 1 – All Tracks

ACS – Level 1 – Course Overview

1. Brief History of ACS (2009-present)
2. ACS Levels 1, 2, 3
3. Level 1 Objectives:
   A. Empower you to plan and lead a conservation service project in your own community.
   B. Certify for you to serve as a Squad Leader for future OA Regional/National Conservation Service Projects.
   C. Energize you to pursue conservation career and volunteer opportunities.

1.

Intro to Outdoor Ethics

Show of Hands

- How many of you enjoy spending time in the outdoors?

- Take a moment and think of your favorite place to spend in the outdoors.
  - Summer camp
  - Lakes/Mountains/Prairie/Woods
  - City/County/State Park

- What do you want that area to look like in 50 years?

Enter Outdoor Ethics

- Outdoor Ethics is a critical part of Scouting America!
- Minimizing our impact is a way to help preserve our favorite outdoor places.
- Outdoor Ethics works hand in hand with Conservation and Sustainability to help educate and communicate on what scouts can do!

What Makes Up Outdoor Ethics?

- The Outdoor Code
- The Land Ethic
- Leave No Trace
- Tread Lightly

Outdoor Ethics Opportunities

Training

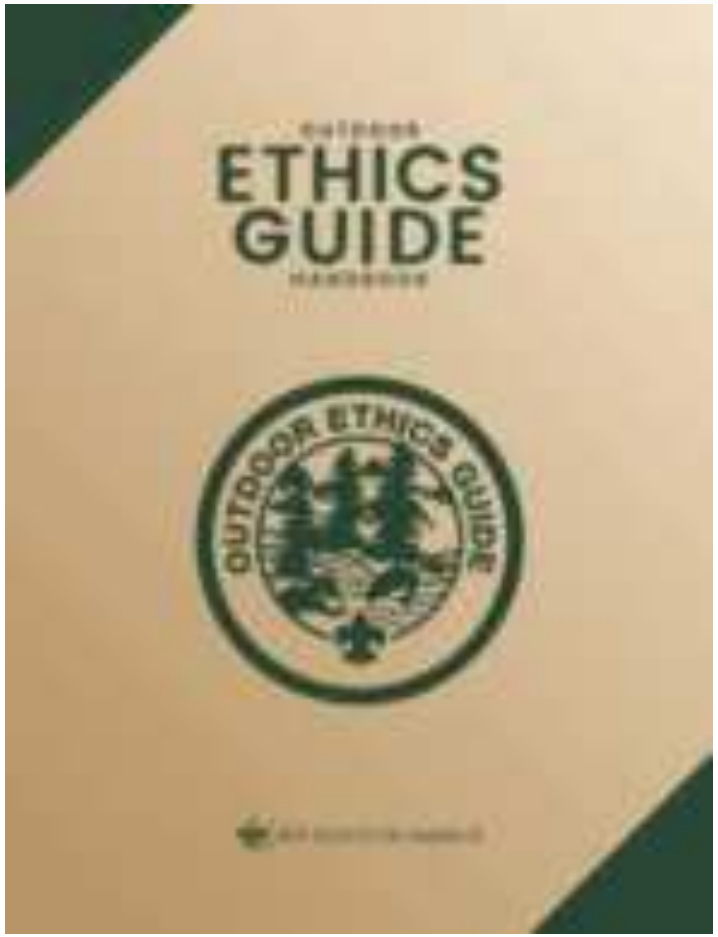
- Awareness Workshop
- SA Outdoor Ethics Orientation
- Leave No Trace Basics
- Leave No Trace Level 1 Course
- Leave No Trace Level 2 Course

Awards

- Outdoor Ethics Awareness Award
- Outdoor Ethics Action Award

Outdoor Ethics Guide

- "… a unique opportunity to help others make choices that reduce impacts to our natural environment."
- This is a role that counts as a position of responsibility.



New Initiative!

- Scouting for Clean Waterways!
- In celebration of the 70th Anniversary of the Conservation Good Turn for America.
- One of Scouting America's SDGs!

National Outdoor Ethics & Conservation Conference 2024

- September 12-14, 2024
  - Pre-conference activities starting September 9th
- Camp Tracy, UT
  - Outside Salt Lake City
- Cost is $225
- Cabins available for extra fee, otherwise bring tent & sleeping bag!

Takeaway Challenge

Consider how you can use the lessons and resources from Outdoor Ethics to help minimize your impact and preserve your favorite places for the future!

2.

Intro to Sustainability

What is Sustainability?

As defined by the UN World Commission on Environment and Development: “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Sustainability in OA

August 2014 - The Advance! - During a national strategy event for the Order of the Arrow, a sustainability exploratory group was formed.

May 2017 - National Committee Sustainability Commitment - The Order of the Arrow makes a public commitment to sustainability within the organization.

August 2018 - First NOAC - The 2018 NOAC was the first conference where sustainability was an officially recognized program committee.

July 2021 – A sustainability track was added to the Arrowmen Conservation School.

Pillars of OA Sustainability

- Outdoor Ecosystems
  - Human Impact
  - Species Support
  - Habitat Advancement
- Food and Waste Management
  - Food Lifecycle and Production
  - Intentional Food Sourcing
  - Local Impact
- Water and Energy Conservation
  - Energy Efficiency
  - Water Efficiency
  - Single Use Water Bottles

Sustainability in World Scouting

- Sustainable Development Goals - 17 UN Strategic Goals
- WOSM adopted and Scouts are the largest youth contributor to SDGs.
- International Programs – Messengers of Peace & EarthTribe.
- BSA contribution - 884 Projects across all 17 goals already completed as of 2022.

3.

Intro to Trail Building

Why We Build Trail

Why We Build Trail

(1) Conservation (Land Management)

(2) Preservation

(3) Recreation

Conservation vs. Preservation

- Conservation and preservation are closely linked and may indeed seem to mean the same thing. Both terms involve a degree of protection, but how that is protection is carried out is the key difference.
- Conservation is generally associated with the protection and use of natural resources, while preservation is associated with the protection of landscapes, buildings, and objects.
- Put simply conservation seeks the **proper use of nature**, while preservation seeks **protection of nature from use**.
- During the environmental movement of the early 20th century, two opposing factions emerged: conservationists and preservationists.
- Conservationists sought to regulate human use while preservationists sought to eliminate human impact altogether.

Why We Build Trail

(1) Conservation (Land Management)

(2) Preservation

(3) Recreation

Conservation vs. Preservation (cont.)

- Conservation generally follows an economic motive.
  - Conservation is an anthropocentric approach to environmental protection.
  - It considers how natural resources can be valuable to humans, encourages humans to make use of them when needed, and advocates for resource protection so that humans can continue to have them for generations to come
- Preservation generally follows a land ethic.
  - Preservation is an ecocentric approach to environmental protection.
  - It's based on the belief that non-human nature is just as important as humans, and that we must respect all life on Earth equally. This the idea of Deep Ecology: the philosophy that recognizes an inherent worth of all living things, regardless of their instrumental utility to human needs.
  - Preservation generally opposes humans extracting value from the environment.

Why We Build Trail

(1) Conservation (Land Management)

(2) Preservation

(3) Recreation

Conservation vs. Preservation (cont.)

- Have you ever wondered why your favorite National Park is surrounded by a National Forest? Well, it didn't happen by accident or guesswork.
  - The National Parks are for preservation.
  - The National Forests are for conservation and are not only used for recreation by the general public, but may also be used, responsibly, by industry for logging, mining, and many other purposes including extensive scientific research on tens of thousands of acres of land.

Why We Build Trail

(1) Conservation (Land Management)

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Conservation (Land Management)

- Land management is the process of managing the use and development (in both urban and rural settings) of land resources.
- Land resources are used for a variety of purposes which may include organic agriculture, reforestation, water resource management, and eco-tourism projects.
- Land management can have positive or negative effects on the terrestrial ecosystems.
- Land being overused or misused can degrade and reduce productivity and disrupt natural equilibriums.

Why We Build Trail

(1) Conservation (Land Management)

(2) Preservation

(3) Recreation

Preservation

- Preservation is the strict setting aside of natural resources to prevent the use or contact by humans or by human intervention.
- In terms of policy making this often means setting aside areas as nature reserves (otherwise known as wildlife reserves), parks, or other similar areas. These areas usually restrict or prohibit activities that may cause damage to habitat or wildlife.
- Having sufficient amounts of contiguous natural lands is vital to the survival of our environment.
- Preservation spaces are required to protect our drinking water supplies and clean air, promote healthier, active lifestyles, preserve habitat for native plants and animal species, and provide nesting and breeding places for birds.
- Land preservation plays a critical role in the future of our environment.

Why We Build Trail

(1) Conservation (Land Management)

(2) Preservation

(3) Recreation

Preservation (cont.)

- The preservation ethic has been codified in the Wilderness Act of 1964, which defines wilderness as:
  - A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area **where the earth and its community of life are untrammeled by man**, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

Why We Build Trail

(1) Conservation (Land Management)

(2) Preservation

(3) Recreation

Recreation

- People need access to open space for recreation, spiritual growth, and activity that promotes health.
- Parks and trails provide a vital resource for everyone for biking, hiking, walking, bird-watching, boating and quiet reflection.
- Outdoor recreation provides:
  - **Physical Benefits** (e.g. lower blood pressure, reduced arthritis pain, weight loss, and lowered risk of diabetes, certain cancers, osteoporosis and cardiovascular disease);
  - **Social Benefits**; **Spiritual Benefits**; **Intellectual Benefits** (e.g. increased confidence, improved creativity, and better self-esteem); and
  - **Emotional Benefits** (e.g. reduced stress, anxiety, and depression).

Why We Build Trail

(1) Conservation (Land Management)

(2) Preservation

(3) Recreation

Recreation (cont.)

- Outdoor Recreation Satellite Account, U.S. and States, 2022; New Statistics for 2022; Updates for 2017–2021:
  - The U.S. Bureau of Economic Analysis (BEA) released statistics today measuring the outdoor recreation economy for the nation, all 50 states, and the District of Columbia.
  - The outdoor recreation economy accounted for **2.2 percent ($563.7 billion) of current-dollar gross domestic product (GDP) for the nation in 2022**.
  - At the state level, outdoor recreation as a share of state GDP ranged from 5.6 percent in Hawaii to 1.4 percent in Connecticut. The share was 0.9 percent in the District of Columbia.

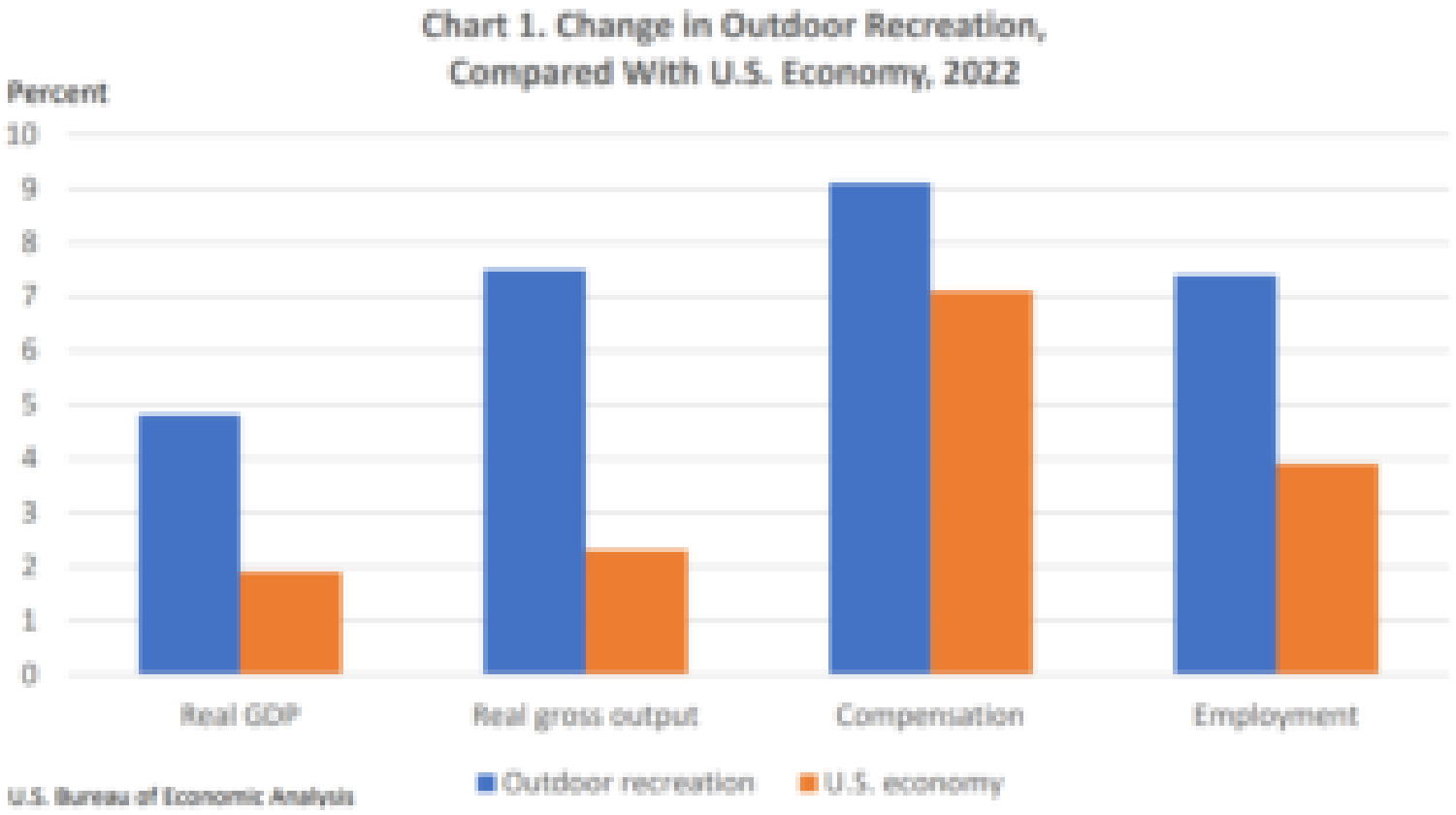
Why We Build Trail

Recreation (cont.)

(1) Conservation (Land Management)

(2) Preservation

(3) Recreation



Why We Build Trail

(1) Conservation (Land Management)

(2) Preservation

(3) Recreation

Recreation (cont.)

- The Outdoor Industry had $1.1 trillion in total economic output during 2022.
- That's more than oil and gas extraction, and mining, combined.

Why We Build Trail

(1) Conservation (Land Management)

(2) Preservation

(3) Recreation

Recreation (cont.)

- Trails provide access to the outdoor recreation industry throughout conservation and preservation lands.
- The outdoor recreation industry, in turn, makes the environmental protection of conservation and preservation lands economically and politically viable.

NOAC 2024

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SEEK NEW HEIGHTS

Trail Tools and Personal Protective Equipment

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Tools of the Trade

Four key things you "MUST" remember about safe tool use:

- **M** = **maintain** your tools
- **U** = **use** them Safely
- **S** = **store** them Properly
- **T** = **transport**/carry them Safely

- Most important tool is your BRAIN!
  - Vast majority of trail work accidents are avoidable and happen because of carelessness and fatigue.
  - Ask yourself:
    - "Does this seem like a good idea?"
    - "Do I feel safe doing this?"
    - "Are the people around me safe when I do this?"
  - "SAFETY DOESN'T HAPPEN BY ACCIDENT!"

Maintain Your Tools

- Safe, properly maintained tools are vital to the success of any trail project.

- Inspect tools regularly.
  - Before, During, and After any work project.
  - Tag and remove unsafe tools from service:
    - cracked or damaged handles.
    - loose heads.

- Keep tools clean and oiled.

- Keep tools sharp.
  - A dull tool is a dangerous tool, because it forces you to swing harder.

Maintain Your Tools

- Basics on proper blade angles:

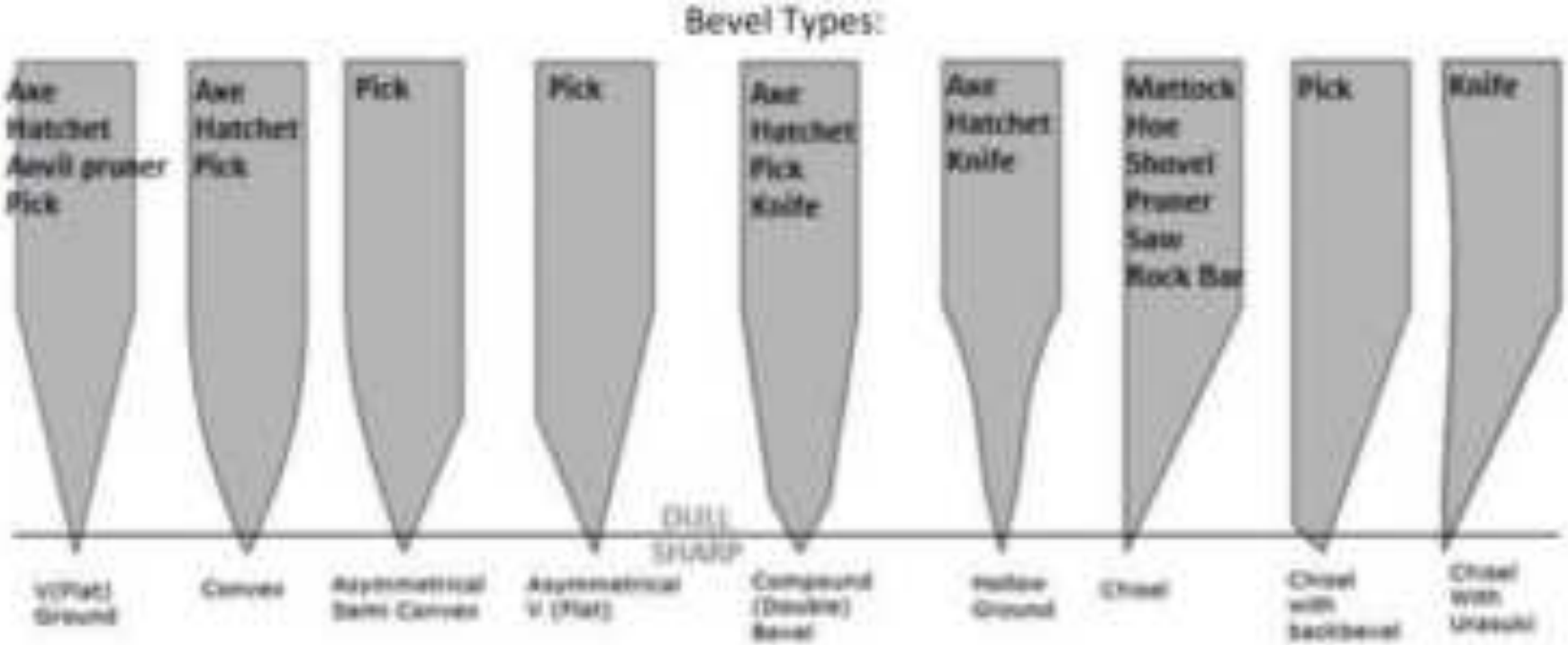
SHARPENING ANGLES

Tool	Recommended Angle*	Tool	Recommended Angle*
Axe		Hand pruner- bypass	0/squared-40, hook is flat
Optional secondary/double bevel	15-22	Hand pruners- anvil	30-60, anvil is flat
Felling (1/64-1/4 inch bevel)	7-15	Pruning shears	10-25 for concave face
Grubbing end of double bit	>25	Grass whip	25
Average	Straight/flat V 45	Hedge trimmer	15
Heavy duty splitting	Convex 50-60	Cutter Mattock- cutter	Straight/V 25-45
Peeling	Hollow Grind 15	Mattock	35-50
Sculpting	Concave 10	Rouge Hoe	25-50
Hatchet- slimmer than an axe	20-30	Pulaski mattock end	30-50
Drawknife	25-35	McLeod	40-50
Hand Saw		Shovel- round/square	35-50/60
Chainsaw		Rock Bar	
Knives	13-16-30		

*or manufactured angle. Some manufactured angles are not intended for cutting. See manufacture's literature for a suggested angle. Tools used for heavy-duty chores that dull the blades quickly should have bigger angles with a relatively short bevel. In contrast, knives, pruning shears, and axes need finer edges: blades sharpened at low angles with a relatively wide bevel.

Maintain Your Tools

- Basics on proper blade angles (cont.):



- Make sure to wear gloves when sharpening.
- Use a wire brush to keep the grooves of your file clean.

Maintain Your Tools

- How to pick a good replacement tool handle
  - Tight grain
  - Grain parallel to the swing plane

Maintain Your Tools

- A few notes on fiberglass tool handles:
  - They are the majority of tools available on the market today and they last a very long time on certain non-impact tools (i.e. shovels, rakes)
  - They do not need to be oiled to avoid dry rot
  - Heads are epoxied to handles, epoxy eventually cracks with repeated vibration on heavy impact tools (sledge hammers, mattocks)
  - Much harder to clean out the head and replace with a wood handle when the head becomes loose
  - You likely would rather deal with wood splinters than fiberglass splinters if a handle breaks.

Maintain Your Tools

What do you need to maintain your tools?

- Sharpening:
  - Flat files (with handles and knuckle guards)
  - Round file (for saw blades and chainsaw chains)
  - Wire brush
- Cleaning:
  - WD-40 / 3-in-1 oil
  - Aluminum foil (trail maintenance); wire brush/steel scouring pad (shop maintenance).
  - Rags/shop towels
- Re-handling:
  - Replacement handle
  - Drill
  - Chisel
  - Sandpaper
  - Wooden wedges
  - Metal wedges
  - Rubber Mallet
  - Hammer
  - 5 gallon bucket
  - Linseed oil

Tools to maintain your Tools (Sharpening)

Tools to maintain your Tools (Rehanging)

Tools to maintain your Tools (Cleaning)

Use Them safely

- Safety starts with PERSONAL PROTECTIVE EQUIPMENT (PPE):
  - Gloves
  - Impact rated goggles or glasses
  - Sturdy boots
  - Hard hats
  - Long pants and long sleeves
  - Water bottles
  - First Aid Kit
  - Radio / Cell Phone
  - Sun screen / insect repellent / goggle de-fogger
  - Other special safety equipment as needed on a case-by-case basis.

- Know your emergency plan:
  - Communication
  - Entry/Exit points
  - Evacuation routes

- Use the right tool for the job.

Use Them safely

- Pace yourself, take breaks, hydrate, and trade off with heavy tools to avoid fatigue.

- Think through the consequences of your actions:
  - Where will this log fall?
  - Where will this log/rock roll?
  - Be ready to jump out of the way if you have to.

- Be aware of your surroundings:
  - Make sure you have a safe clear radius that is appropriate for the tool you are using.
  - You should be able to stand with your swinging tool extended fully in your arms in any direction without coming close to another worker.
  - Make sure those around you have their PPE too.

- Communicate
  - Let people know when you are entering their tool radius.
  - Let them know when it is all clear to resume work.

Use Them safely

- Clear your work area
  - Remove obstacles when swinging tools
    - Low overhead branches
    - Loose rocks under foot
- Always swing a cutting tool away from your body
  - Stand such that a glancing blow will not hit your body
  - If you must swing toward yourself, choke up and use short controlled swings
- Be aware when swinging tool over your head
  - In many cases, there is no need to swing a tool over your head, let the weight of the tool do the work
  - Never swing a jam bit tool over your head
- Make sure tool handles are clean to avoid loosing your grip

Use Them safely

- Don’t sprint the Marathon!
- Hydrate or Die-drate.
- Think before you do!
- Always be watching.
- No Phones?! Still know how to talk right?

- Make sure your space is clear.
- Swing away!
- Hollywood is full of lies! No overhead swings.
- Slippery when wet.

Store them properly *(at the worksite)*

- During the workday:
  - Sheathe sharp tools when not in use.
  - Always store tools on the uphill side of the trail with the sharp end away from the trail and the handle still slightly on the trail so they don't get lost.
  - Do not bury bladed tools in the ground.
    - Not only is this bad for the tool but it the exposed handle creates a tripping hazard.
  - Always store tools with the most dangerous edge towards the ground.
    - Think the tines on a rake or the tip of a shovel.
  - Beware of groups working below (especially in areas with switchbacks).
  - Rest heavy tools alongside stumps or large rocks so they do not slide away.
    - Be extra careful with tools such as rock bars and tamper bars to avoid "land torpedoes"

- Storing tools overnight on site:
  - Clean.
  - Well wrapped
    - Use a tarp to wrap your tool cache like a burrito.
  - Out of sight.

Store them properly *(at the worksite)*

Transport them safely

- Always handle tools with gloves and PPE.
- Always sheath tools when carrying them.
- Always carry tools in your hands with your arms down at your side.
- Carry tools on the downhill side, with the sharp end forward (handle to the back), and with the sharp end pointing away from you.
  - If you slip, toss the tool to the side and forward to prevent falling on the blade.
  - We carry tools on the downhill side to prevent the tool from falling onto you.
- If you must carry a tool in each hand, carry the heavier or more dangerous tool in the downhill hand.
- Never carry tools on your shoulders
- Maintain a safe distance between you and the person hiking in front of you.

Right tool for the job

- **Cutting/Pruning Tools**
  - Axe
  - Bow saws / extra blades
  - Folding saw
  - Cross cut saws
  - Loppers
  - Hand pruning sheers
  - Chainsaws
    - Requires special PPE (earmuffs, face shield, jacket, and chaps, in addition to standard PPE), oil, fuel, and extra chains.
- Use:
  - Clearing trail corridor
- Common mistakes:
  - Cutting things that are too big for the tool
    - Bow saws should not be used for logs that are larger in diameter than the distance between the blade and the handle.
    - Loppers should not be used to cut anything larger than the diameter of the handle.
  - Twisting when trying to cut with loppers
    - This separates the hook and the blade and makes the tool much less effective
  - Using dull saw blades
    - Often extra life can be salvaged from a bow saw blade without sharpening by simply bending the tines back to proper positions.

Right tool for the job

- <u>Cutting/Pruning Tools</u>

Right tool for the job

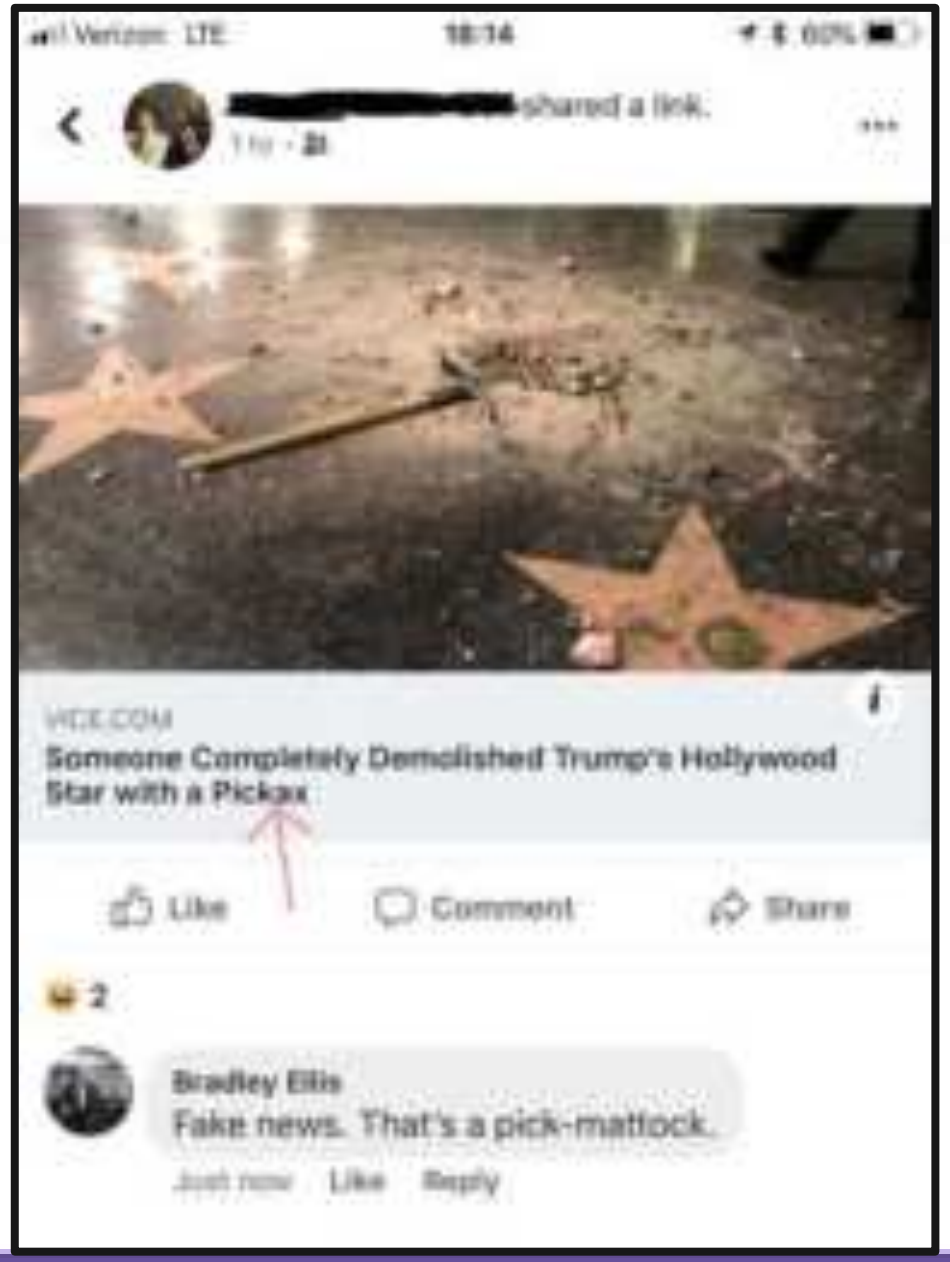
- **Grubbing Tools**
  - Pulaski
  - Pick Mattock
  - Cutter Mattock
  - Hazel Hoe
  - Garden Hoe
  - Fire Rake
- Use:
  - loosening dirt
  - removing the top layer of soil
- Common mistakes:
  - Using for prying.
  - Don’t swing the axe end of a Pulaski into the dirt.
    - Use axe end for cutting only after the adze end has been used to clear the dirt.
  - Don’t swing a jamb-bit tool over your head.
    - Use the weight of the tool instead.

Right tool for the j

- **Grubbing Tools**

Right tool for the job

- Example of properly using a Pick Mattock in a joke.



Right tool for the job

- **Digging/Moving Tools**
  - Shovels
  - Rock bar
  - 5-gallon buckets
  - Tool bag
    - Pro-Tip: Use heavy-duty, canvas duffle-bags with backpack straps).
  - Wheel barrows
  - Rock slings
    - Pro-Tip: Use a rock sling made of webbing. Rock slings made of chain inherently vastly increase the weight to carry.
- Use:
  - Moving dirt, gravel, or other fill material.
- Common mistakes:
  - Stacking Buckets after deformation from use
    - Can render Buckets permanently stuck together (decreasing your useful Bucket supply).
  - Carrying Buckets by the handle.
    - Buckets should be carried by supporting the bottom.
    - Pro-Tip: put the bucket in the tool duffle-bag prior to filling, then carry the bucket like a backpack.
  - Using shovels to dig.
    - Soil should be loosened by a grubbing tool and the loose soil should be moved with a shovel.

Right tool for the job

- <u>Digging/Moving Tools</u>

Right tool for the job

- How to Make an OA Webbing Rock-Sling
  - https://www.dropbox.com/scl/fi/jtv187rkiibl0yo9906tr/OA-Rock-Sling-20180729.pdf?rlkey=oxvlguc7cm108h7mhshrwe6kh&dl=0

Right tool for the job

- **<u>Pounding Tools</u>**
  - Sledge hammers
    - Come in various sizes (8 lb, 12 lb, 20 lb, etc)
  - Mallets (aka *Engineer's Hammer* or *Crack Hammer*)
    - Come in various sizes (2 lb, 3 lb, and 4 lb most common).
  - Chipping hammer.
  - Splitting Mauls
- Use:
  - Breaking or shaping rock
- Common mistakes:
  - Poor posture when swinging sledge hammers.
  - Poor aim leads to broken handles.
    - <u>Pro-Tip</u>: target should be just beyond reach (removes any chance of over-shooting and breaking the handle on the target).

Right tool for the job

- **Pounding Tools**

Right tool for the job

- **<u>Finishing/Compacting Tools</u>**
  - Feet
  - Tamper bar
  - Tamper pad
  - McLeod
  - Bow Rake
  - Fire Rake
- Use:
  - Compacting and stabilizing tread.
  - <u>Pro-Tip</u>: McLeods are an amazing finishing tool, but some have a large nut on the bottom of the plate which eats into the treat if you use it for light tamping. Preference for McLeods with smooth, flat bottom plate.
- Common mistakes:
  - Underestimating the usefulness of feet and hands as finishing tools.
  - Using for prying.

Right tool for the job

- **Finishing/Compacting Tools**

Right tool for the job

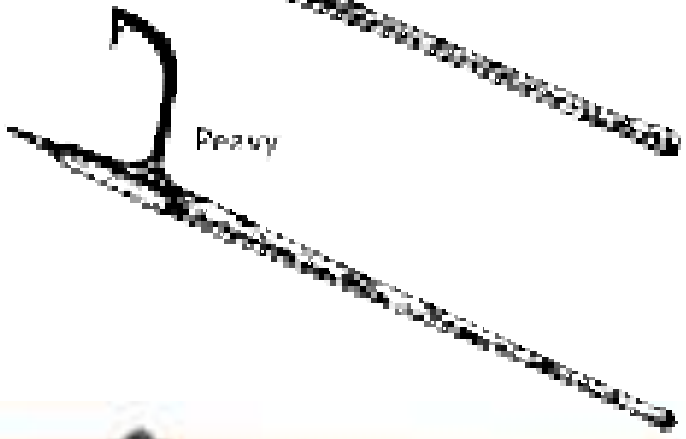
- **Carpentry Tools**
  - Primitive Structures
    - Draw knives
    - Tape Measures
    - Augers
    - Chisel
    - Chalk-line
    - Hammers
    - Nails (Nail pouches)
    - Rebar
  - Non-primitive Structures
    - Screw Guns/Impact Drivers
    - Circular saw
    - Reciprocating saw
    - Generator

Right tool for the job

- **Common Miscellaneous Tools**
  - Flagging tape / Surveying Flags / Marking paint
  - Rope / Twine / Parachute chord
  - Tarp
    - Pro-Tip: Use very large size to use for tool cache burrito.
  - Trail Work Signs (for both ends of the work area of the trail)
    - Pro-Tip: Hard laminate your trail works signs to ensure they survive all weather conditions.
  - Line Level
  - Log Tong / Peavy Hook / Cant Hook
  - Timber Slick
  - Clinometer (aka *tilt indicator*, *tilt sensor*, *tilt meter*, *slope alert*, *slope gauge*, *gradient meter*, *gradiometer*, *level gauge*, *level meter*, *declinometer*, and *pitch & roll indicator*).
    - Used for measuring slope.
- Others as needed.
- Always work with your benefiting organization/land manager to understand any unique circumstances to your project in order to ensure you have all the necessary tools.

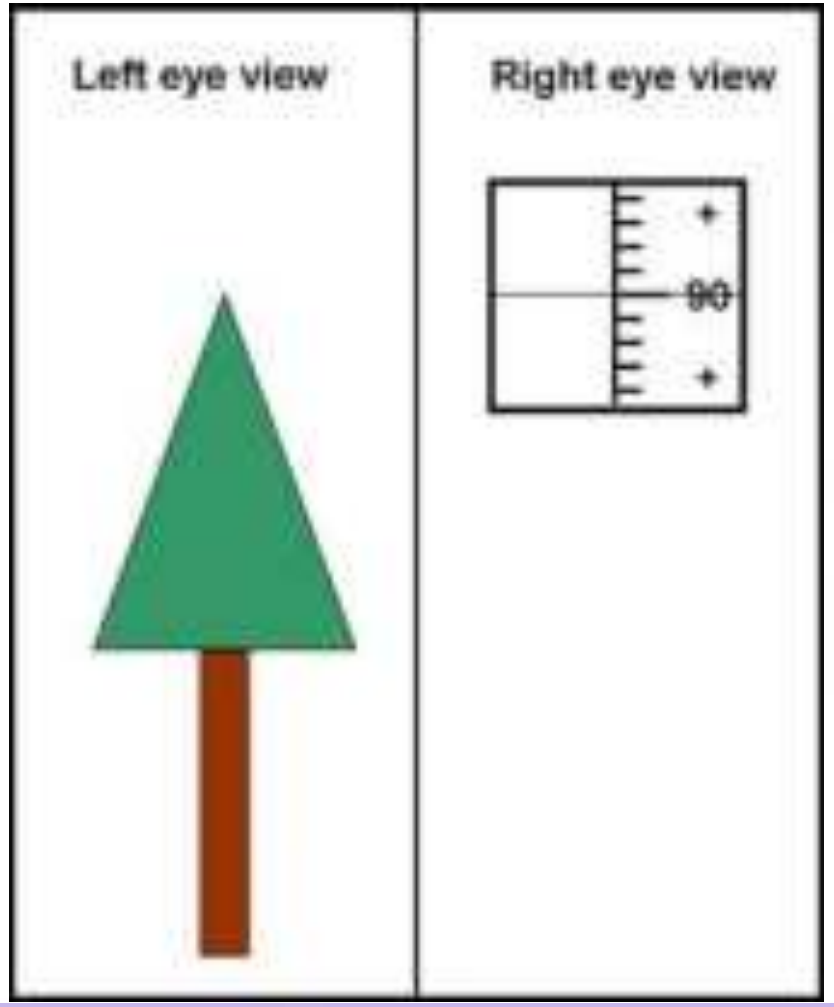
Right tool for the job

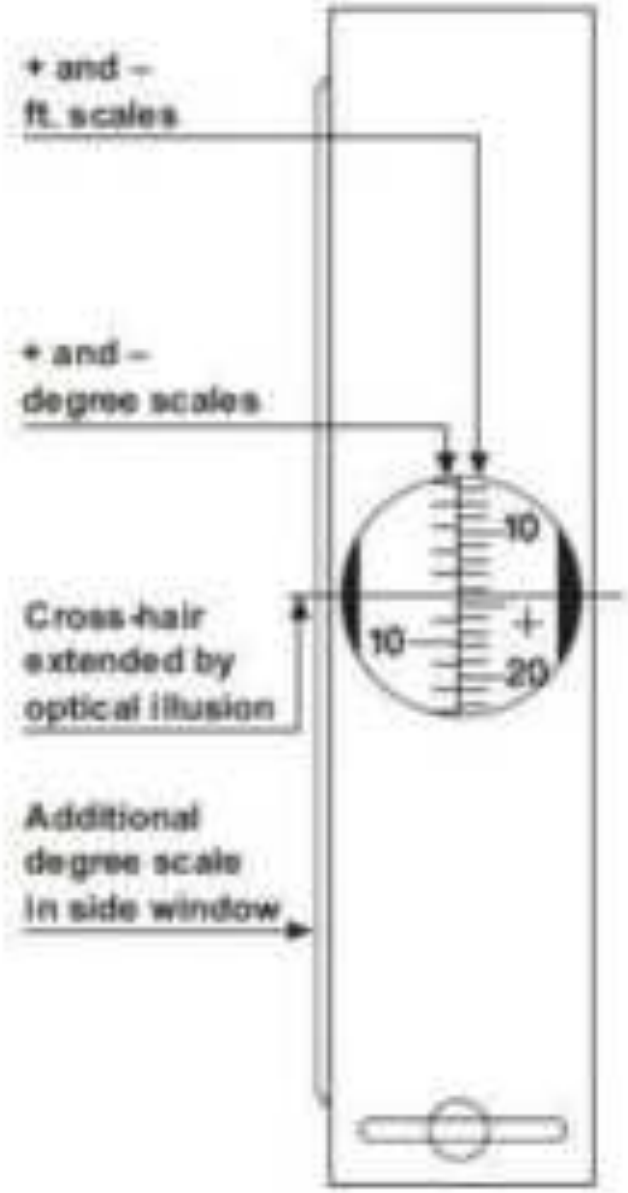
- <u>Common Miscellaneous</u>



Right tool for the job

- <u>Using a Clinometer</u>





Right tool for the job

- **<u>Example Trail Work Sign</u>**

Right tool for the job

- **<u>Example Trail Stakes Between Sections</u>**

Typical Tool Cache

- Based on Crew size of 15 workers

	New Trail Construction	Major Trail Repair	Light Trail Maintenance	Easily Accessible Trail Work
Cutter Mattock	3	3	1	3
Pick Mattock	2	2	1	2
Hazel Hoe	1	1	1	1
Loppers	2	2	3	2
Folding Saw or Bow Saw	2	2	3	2
McLeod	1	1	1	1
Garden Hoe	1	1	1	1
Pulaski	1	1	1	1
Shovel	2	2	2	2
Rock Bar	1	1		1
Sledge Hammer 8lbs	1	1		2
Tamper Bar	1	1		1
5gl Buckets	2	2		2
Wheel barrow				2
Duffle Bags	2	2	2	2

Universal Trail Safety Lexicon

- "**Eyeballs**!" = "I am about to swing a tool. If you can hear me, put your goggles and helmet on."
- "**Rock**!" = "A large object has gotten out of control. Look uphill and dodge accordingly."
  - Note: before moving a heavy object, you should always communicate to downhill crews that might be in harms way, and clear the area below as necessary.
- "**Car**!" = "Civilians are using the trail. Stop work and move off the trail to let them safely pass.
  - "**Game On**!" = "The civilians have all passed; resume work."
    - (Adopted from the Wayne's World street-hockey scene).

Trail Tool References

OA Foremen

Trail Construction and Maintenance Notebook (2007 Ed.); USDA Forest Service; http://www.fs.fed.us/t-d/pubs/pdfpubs/pdf07232806/pdf07232806dpi72.pdf

Tools for Trails; Jim Schmid, Colorado Outdoor Training Initiative; http://www.americantrails.org/resources/info/tools1.html

https://trailism.com/wp-content/uploads/2014/11/Maintaining-Trail-Tools.pdf

Takeaway Challenge

- Go home and properly maintain all your tools in your garage.
- Watch Wayne's World (1 & 2)

NOAC 2024

UC Boulder

SEEK NEW HEIGHTS

The Planning Process and The Incident Command System

Basic Understanding

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The Planning Process (Key Tasks)

Identify a Meaningful Project

- Look local
  - Scout functions
  - Community groups
  - Charter organizations
  - Council properties
  - Public lands
  - Privately held conservation lands
  - Land-management agencies
- See a need, fill a need
- Identify stakeholders and obtain permission
- Identify applicable land management plan and regulations

Assemble your team

- Define your volunteer group
- Look to local and or regional resources
  - Scouting
  - Community groups
  - Local agencies / government
  - Other non-profits

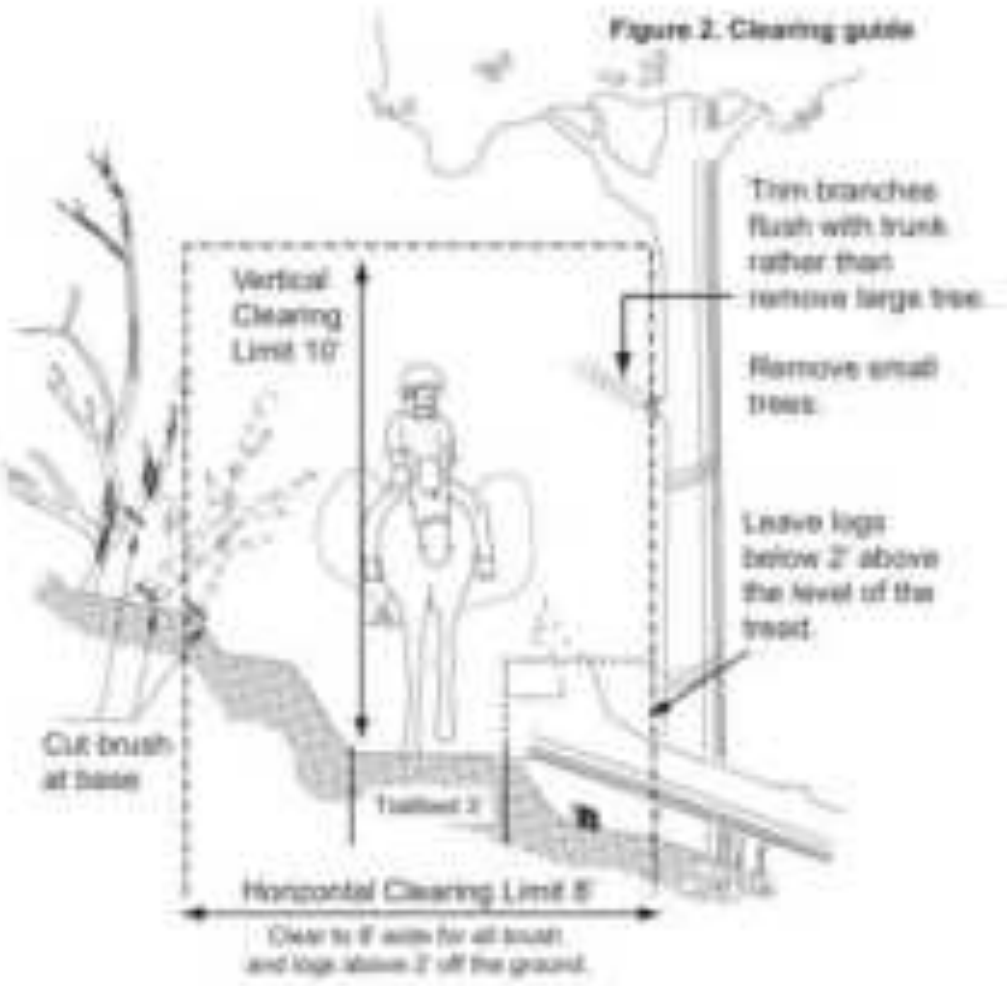
Develop & Implement your plan

- Define goals & scope
- Establish measurable objectives
- Identify what tools/support your group needs
- Identify available resources
- Coordinate resources with outside groups
- Build command structure
  - Incorporate ICS
- Develop a timeline with a backward calendar.

Define the Project's goals.

- What are the land owner's/ manager's needs?
- Examples:
- US Forest Service Standard Specifications: https://www.fs.usda.gov/managing-land/trails/trail-management-tools/trailplans
- Each of the National Scenic Trails typically have their own design manuals.

Example equestrian clearing specifications



BWCAW clearing specifications for OAWV

- Define the Project's goals.
  - What are the land owner's/ manager's needs?

- 8 feet wide
- 12 feet high
  - Most portgagers angle the bow of the canoe upward, which results in a 10-12 foot high reach.
- Trim all the way around the tree at the same level trimmed for the corridor.
  - Prevents trees from being damaged due to lopsided snow coverage.
- Cut branches a few inches out from the trunk to prevent sores.

Equestrian Design Considerations

- Equestrian trails will require wider and higher corridors.
- Open-faced culverts and immediate elevation changes should be avoided.
- Check Dams and Water Bars may be hard to navigate for horses.
- Turnpikes will need to be wider.
- Tread in general needs to be well compacted and may require a denser base of gravel in especially wet environments.

Mountain Bike Design Considerations

- Similar to equestrian trails, trails built primarily for mountain biking cannot include features with abrupt changes.
- With curves, bikes have a minimum turning radius mandating a minimum diameter.
- With in elevated curves, the trail may need to be in-sloped, requiring special drainage considerations.
- Depending on the space available, closed-face culverts/drains can be cut into the trail.
- Grade reversals, knicks, and rolling grade dips are the primary features used to help shed water off the trail.

- ***ICS is part of the BSA program already***

- Search and Rescue Merit Badge

- Emergency Preparedness Pin

Both ask you to Complete IS-100, Introduction to Incident Command System

Learning Objectives

1. Learn what the ICS is.
2. Learn the main parts or jobs
3. How does it relate to us.

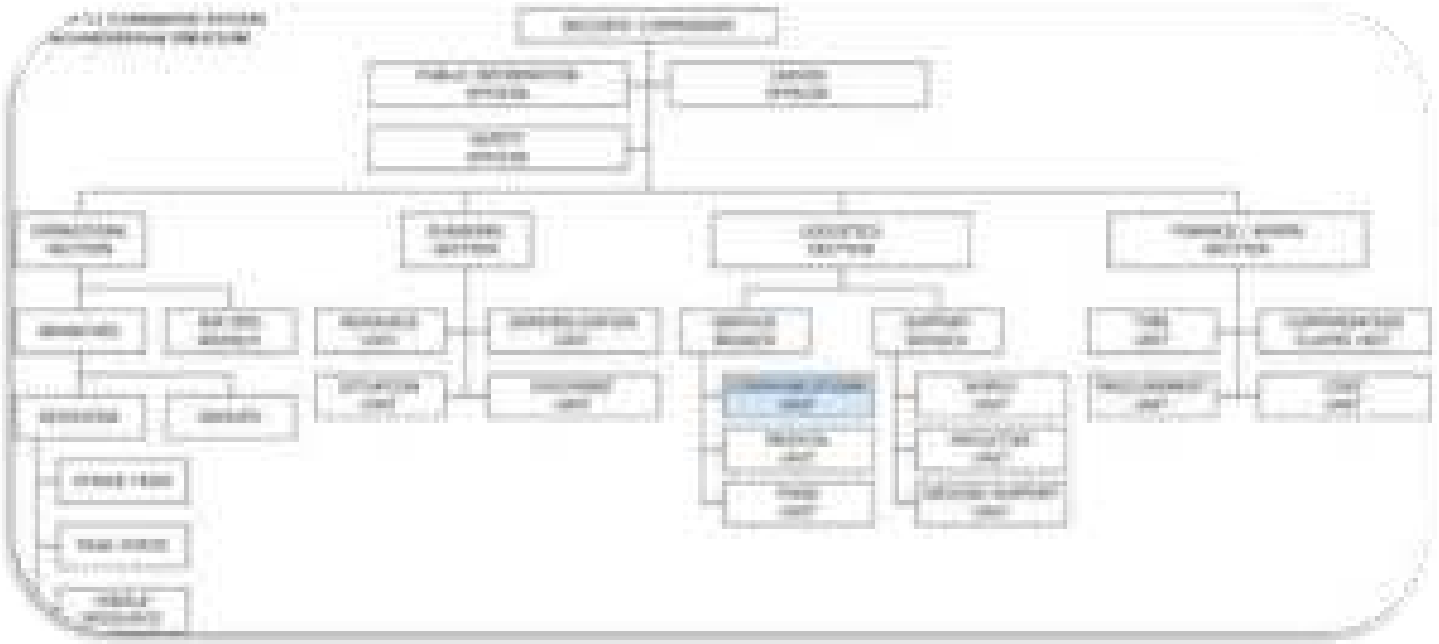
1.
Learn what the ICS is.

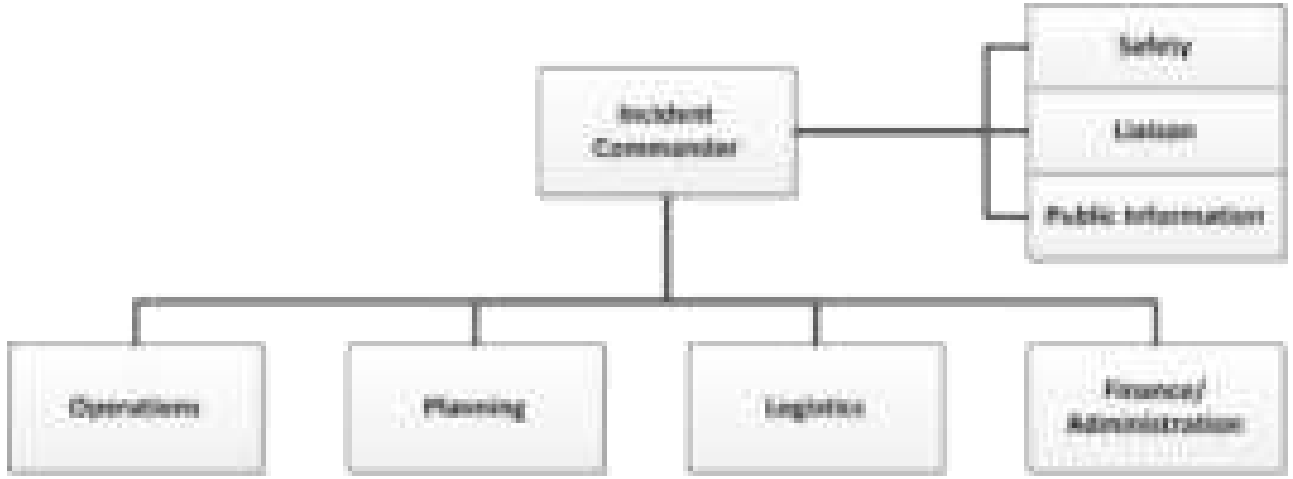
What is the Incident Command System (ICS)?

- The Incident Command System (ICS) is a standardized approach to the command and control of projects or incidents that provides a common leadership outline within which people from multiple agencies can be effective.

- Provides a method for managing a large amount of people.
- Used by the most government agency's for managing events where multiple agencies are involved.
  - Provides a method for agencies with different titles to interact.
  - Used for natural disaster relief.
- Has the ability to be changed for scale (larger or smaller).
- Allows for many stakeholders to co-manage.
- Used for natural disaster relief.
- Was used for ArrowCorps5 (2008), SummitCorps (2011), and BNRTC (2017).

Big and Complex



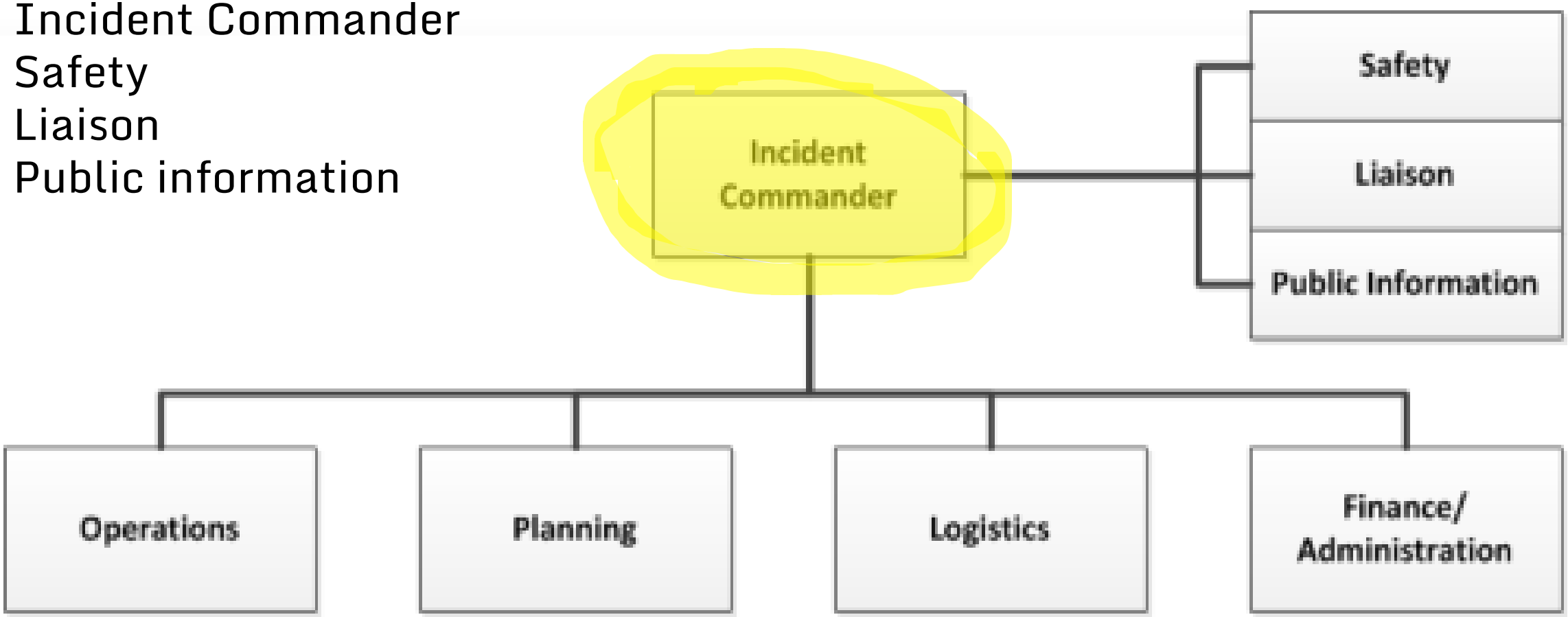


Simple and Easy

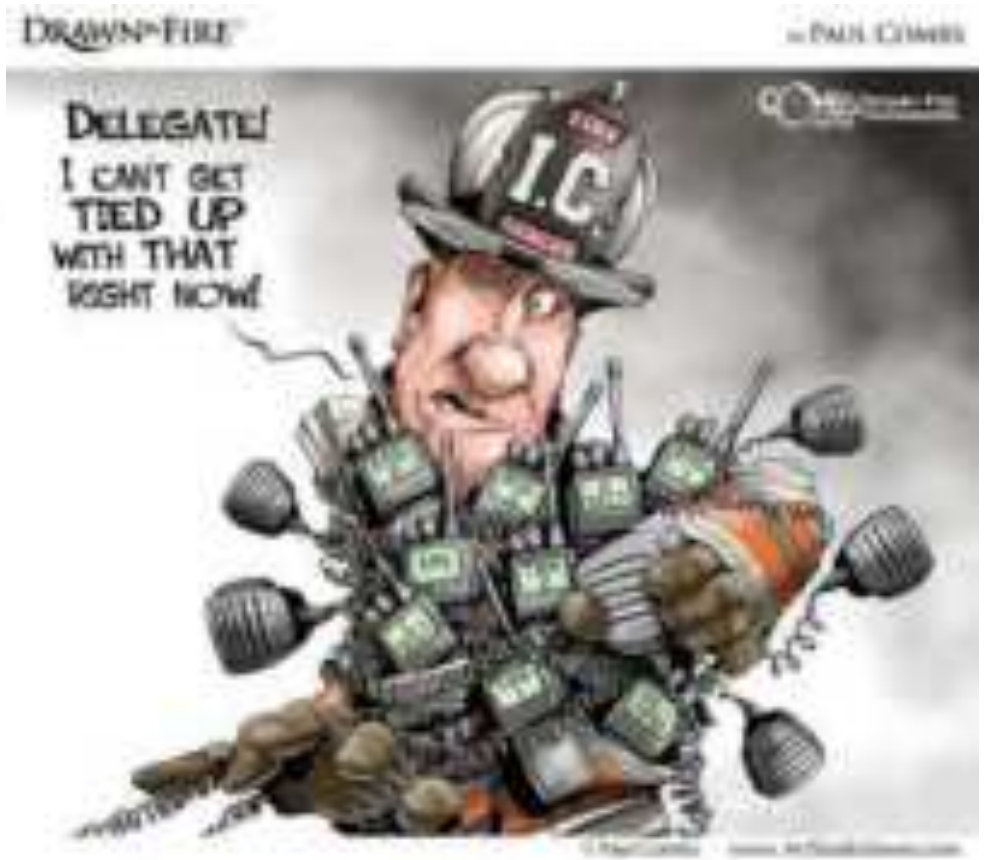
2.
Main jobs

Let's start with the **Command Staff**:

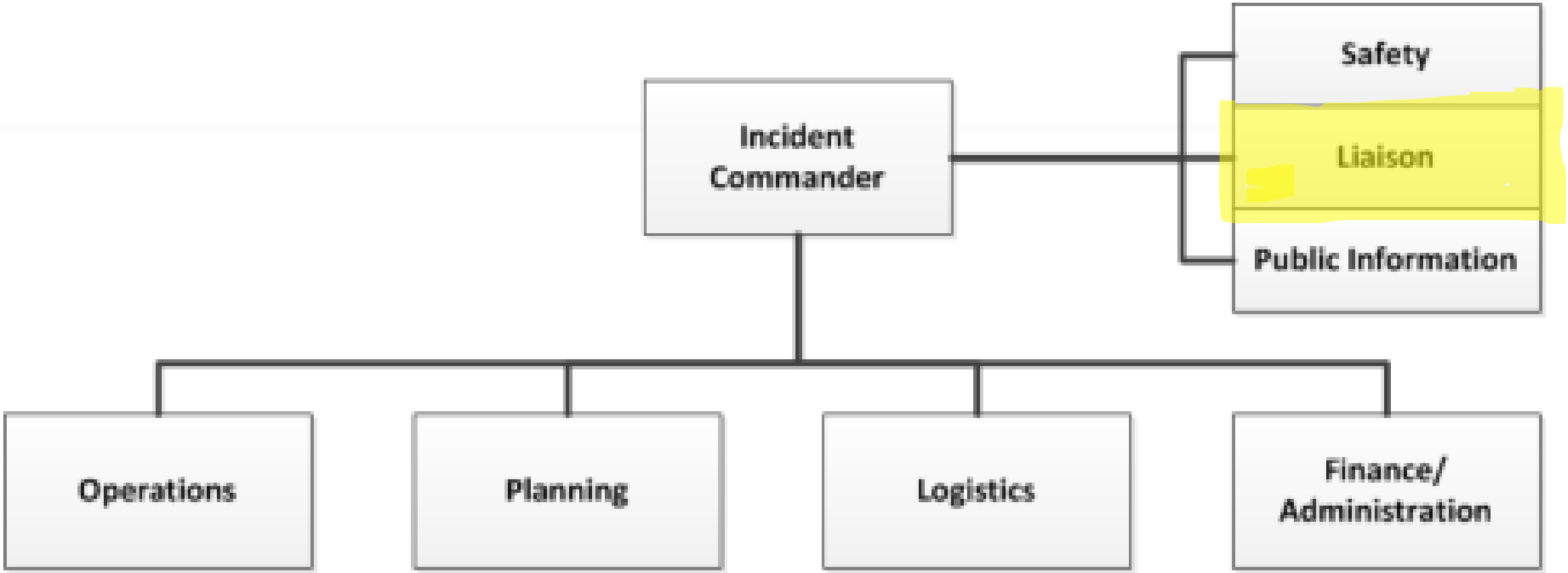
- Incident Commander
- Safety
- Liaison
- Public information



Incident Commander (“IC”)



- The "IC" has overall authority for the incident.
- Can all be youth (with advisers).
- Can have a “Joint” Command Staff where the stakeholder (the USFS for example) can also appoint an Incident Commander, and the two IC’s work together.


Incident Commander
Safety
Liaison
Public Information
Operations
Planning
Logistics
Finance/ Administration

These two can be the same person if needed.

- **Public Information Officer –**
- In charge of press releases a very good idea for a large project, able to generate good press for the BSA.

- **Liasons –**
- Able to interface with other organizations.
- Added as necessary
- Media
- Project-Partners
- Sponsors

Public Information Officer

SummitCorps 2011 Action Plan

Public Information Officer

Executive Summary

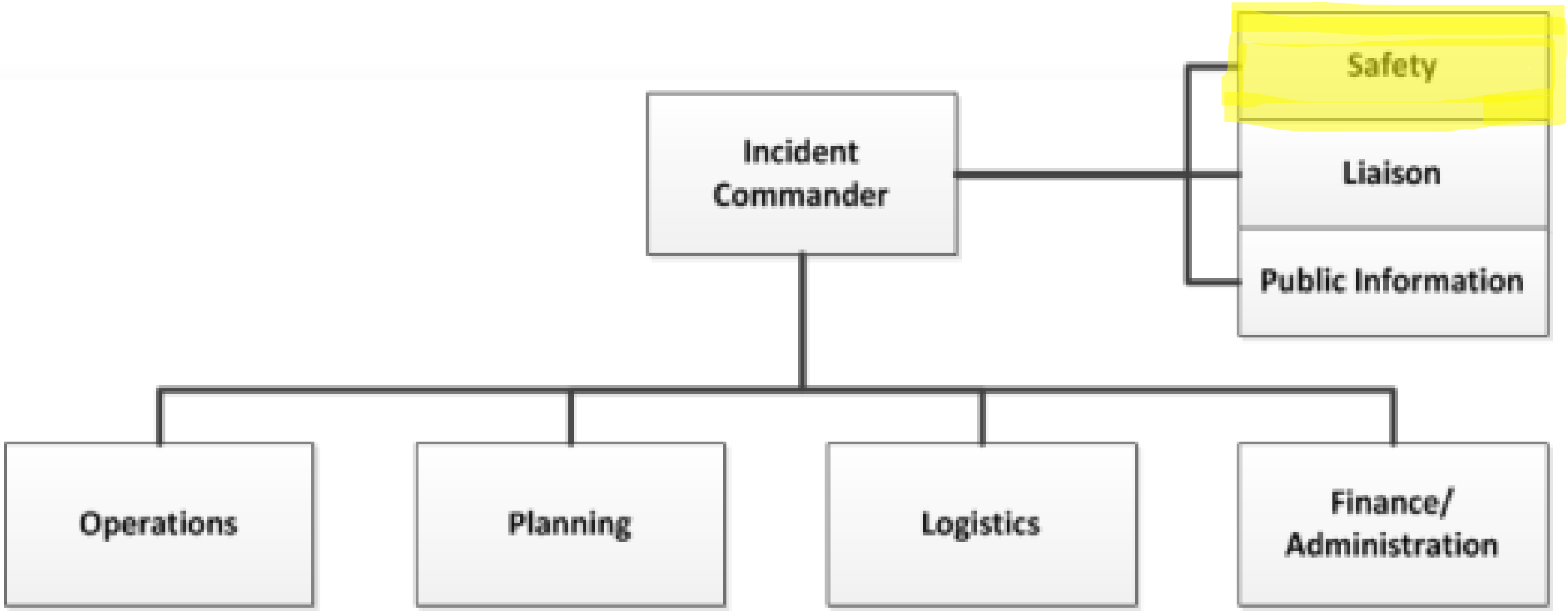
Provide public and media relations that will communicate our project on a national, state, and local level. These Relations will be executed in conjunction with the National Parks Service and the West Virginia National Guard.

Objectives

1. Effective use of National Media outlets to communicate the project on a national level
2. Effective use of State and Local Media outlets to communicate the project more locally both at the work site and around the country.
3. In order to increase media coverage of SummitCorps, as well as create a memorable event for the guests, this committee will invite dignitaries and VIPs from government, sports, and/or pop culture to attend and speak at the event.
4. As this project will be the first major Scouting event at The Summit, this committee will endeavor to demonstrate to the local community the values and ideals of the Boy Scouts who will be sharing the area with them.
5. Keep visitors/the project up to date on events and news going on within the project.

Assumptions

1. Park Service, National Guard, and BSA Public Information Officers will provide liaisons with their respective organizations.
2. We will be welcome in the local community; however, we have an obligation to keep them up to date about this project.
3. BSA crisis communication plan and Public Relation firm will be provided to this event.
4. We need to facilitate internal communication within the project.
5. Local and State government officials will be interested in the project.
6. Local and State media will be interested in the project.


Incident Commander
Safety
Liaison
Public Information
Operations
Planning
Logistics
Finance/ Administration

Safety Officer

- They are in charge of making sure that there is a safety and emergency plan.
- They are also the ones responsible to make sure they are followed.
- Safety can shut down a work site at anytime they feel it is unsafe.

Safety Officer

SummitCorps 2011 Action Plan

Safety Officer

Executive Summary

Safety will engage guests and staff in all phases of the summit corps experience by providing initial orientation briefing, daily safety talk briefing notes, worksite oversight and communication and coordination with site IC and Staff. Safety personnel will work in coordination with National Park Service staff to ensure joint operations are complimentary in direction and procedures.

Objective

To promote health and safety awareness and practices among guests and staff minimizing opportunities of potential injury.

Assumptions:

Guests and Staff will bring required clothing and personal equipment

All personnel will attend orientation

All personnel will conduct themselves in a professional scout like manner

All injuries and illnesses will be reported to ICREW leader

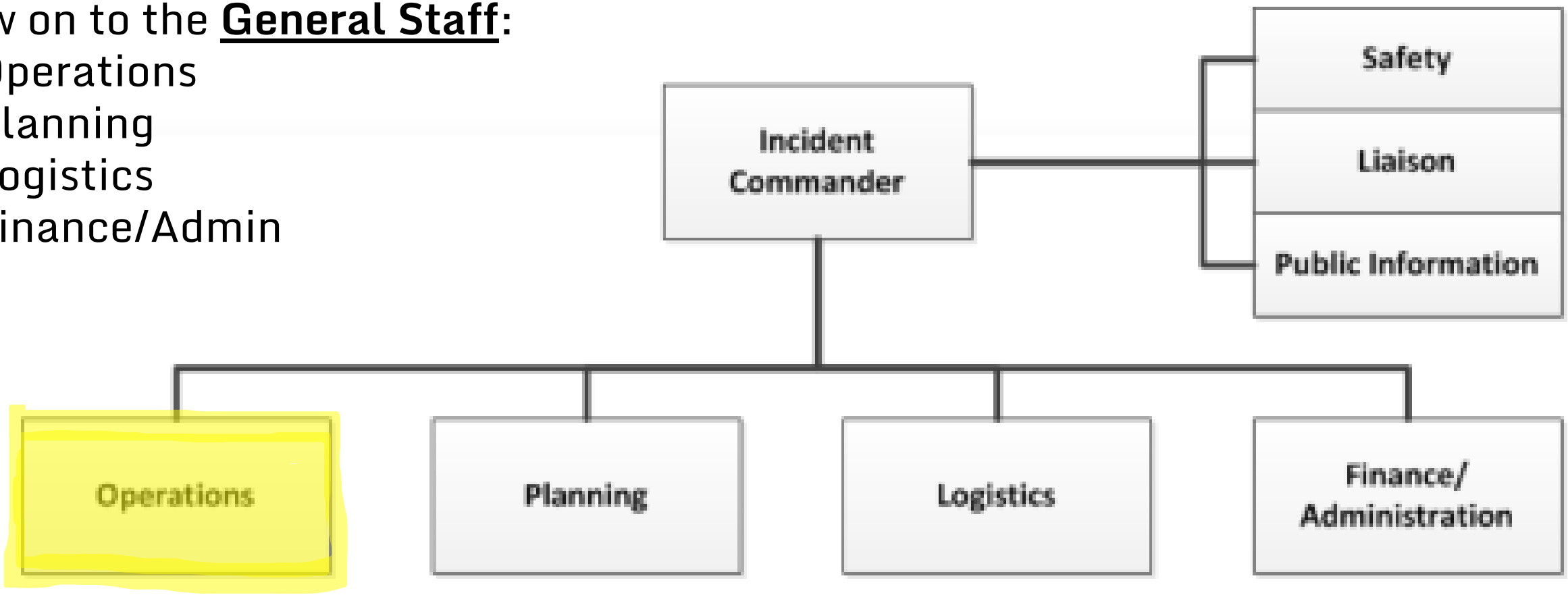
All personnel will participate in a medical call and equipment check

I-Corps will hold daily safety briefings and tool talk

Adequate rest periods will be observed

Now on to the **General Staff**:

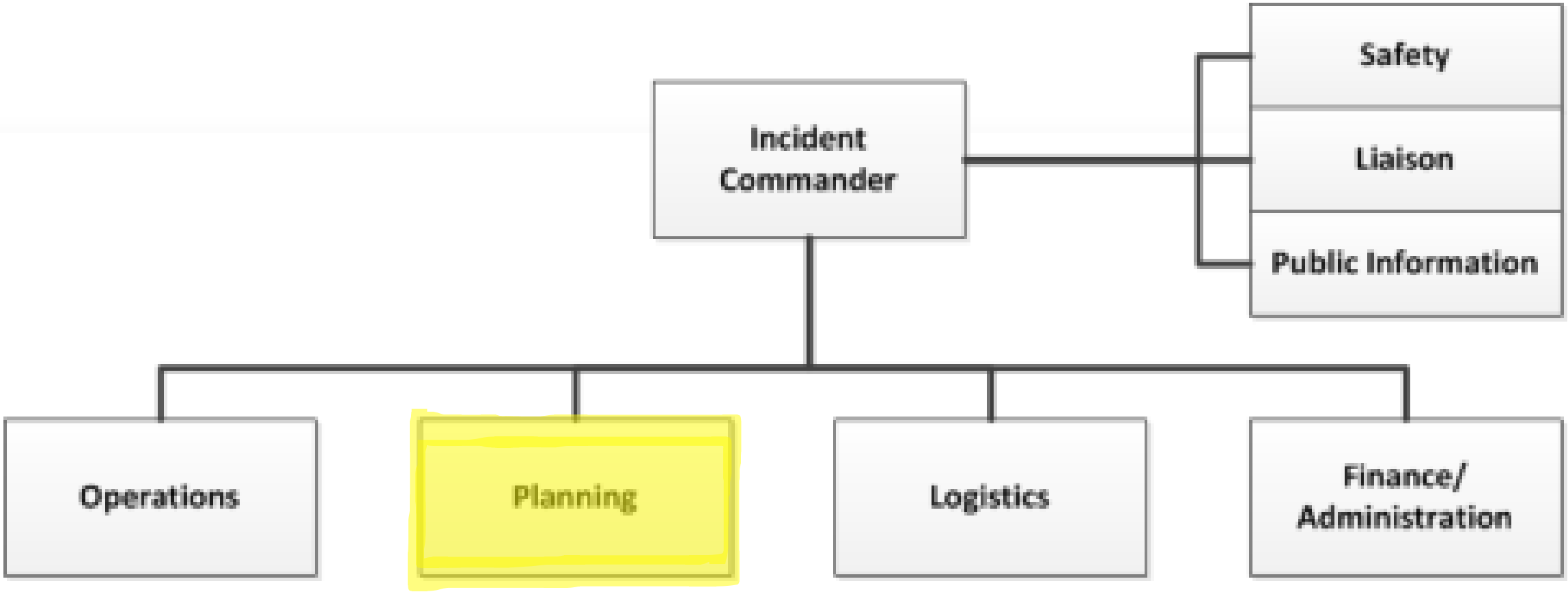
- Operations
- Planning
- Logistics
- Finance/Admin



Operations Section Chief

In charge of all of the workers.

All operations directly applicable to the primary mission of the incident report to OPs.


Incident Commander
Safety
Liaison
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Operations
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Finance/ Administration

Planning Section Chief

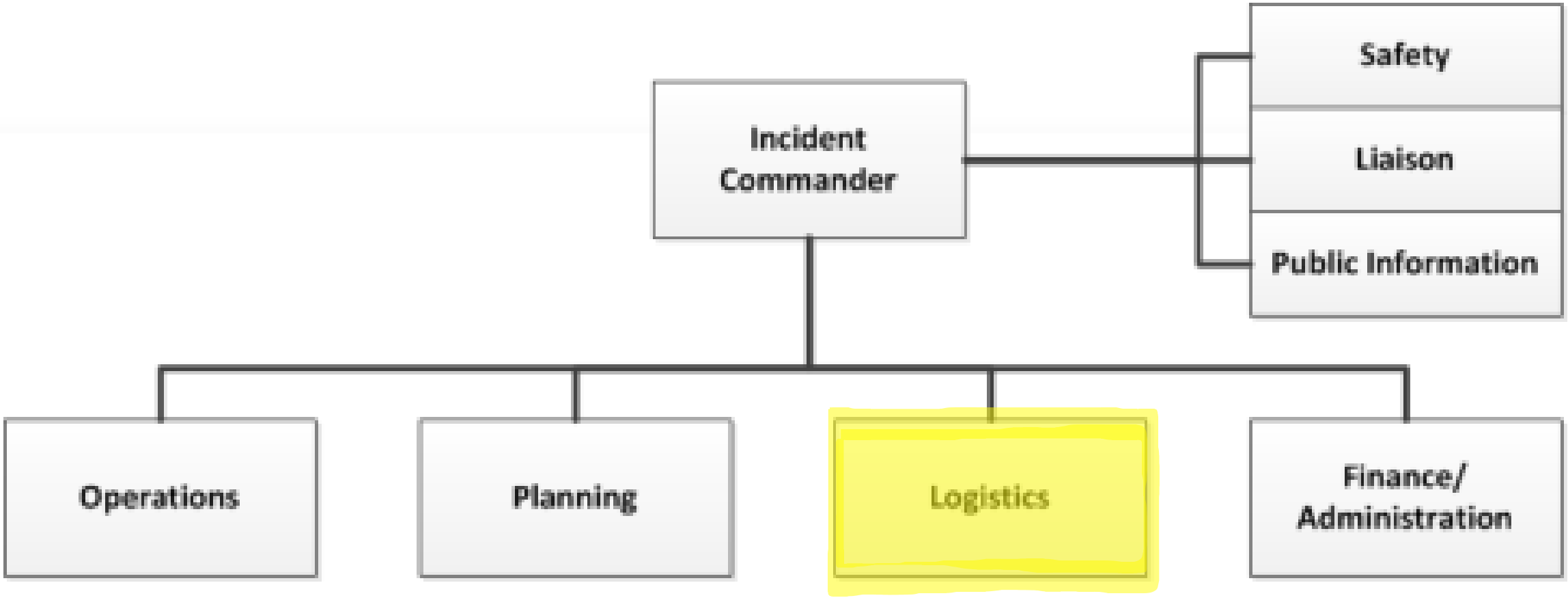
In charge of all aspects of documentation and contingencies.

Responsible for collecting, evaluating,
and disseminating the tactical information related to the incident, and for preparing and documenting Incident Action Plans

Planning Section

- You act as a “traffic cop.” You make sure that all the pieces of the project fit together.
- You work with each of the other components of the Command Staff to make sure that the flow of the schedule is seamless.
- You are in charge of the program components (e.g., recreation, and opening and closing campfires or shows.)

This Photo by Unknown Author is licensed under CC BY-SA


Incident Commander
Safety
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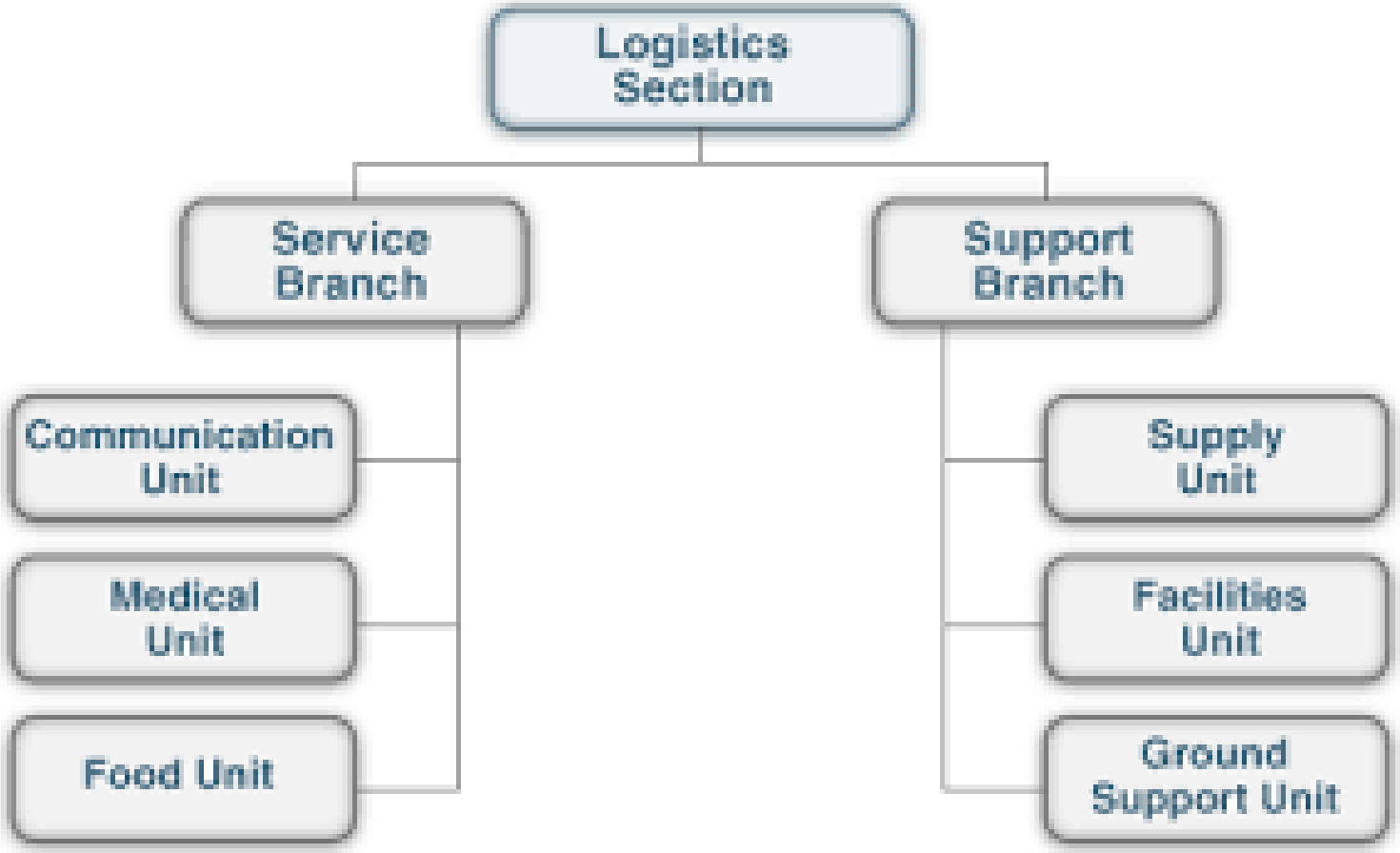
Operations
Planning
Logistics
Finance/ Administration

Logistics Section Chief

In charge of procuring and
maintaining all facilitie s, services, equipment, and materials.

Logistics Section (cont.)

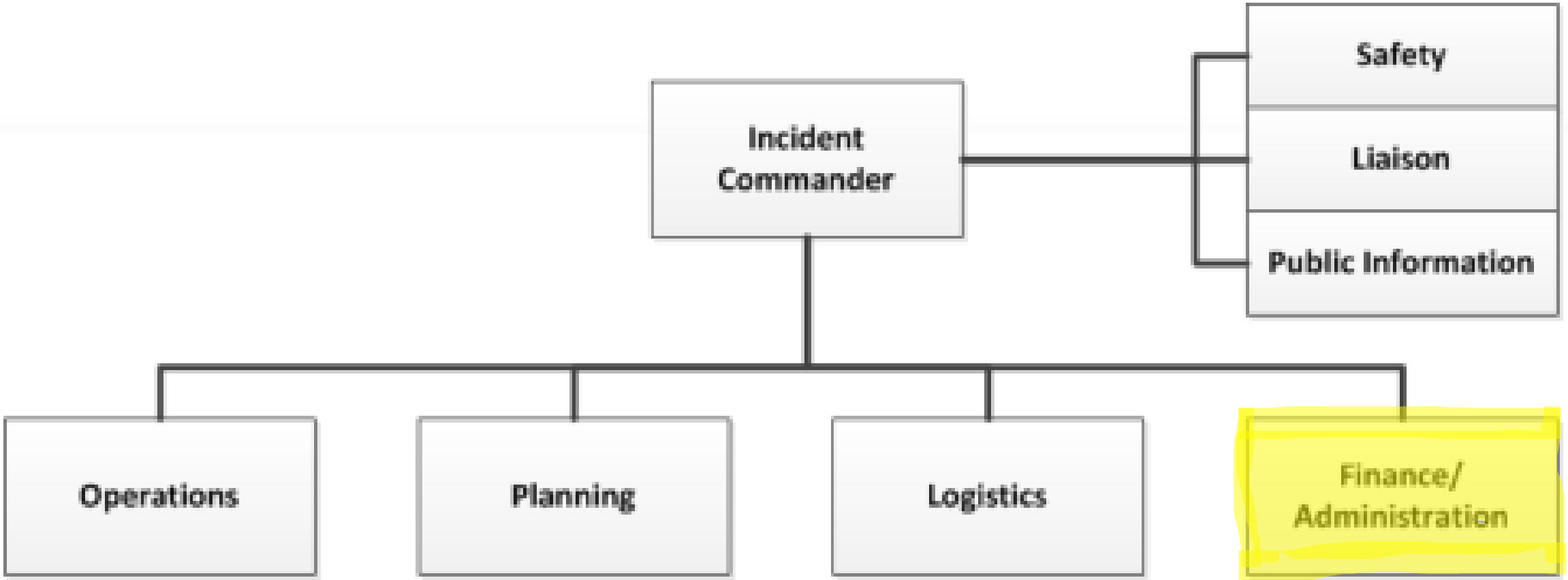


Logistics Section (cont.)

The Logistics Section is in charge of obtaining all materials needed for the service project, and supporting the Operations Section with materials for success of the Project/Incident.

- **Service Branch** provides all services for the Incident and/or which Operations may need
  - Communications, Medical, Food, etc.
    - Base camp/Incident Command Post management.
    - Meals.
    - Event communications system (base camp and field operations).
    - Event medical (base camp and field operations).
    - Security
  - Think of them as the Commissary.

- **Support Branch** provides all support for the Incident and/or which Operations may need
  - Supply, Facilities, Ground Support, etc.
    - Transportation
      - Airports; worksites; transportation safety; work trucks.
    - Trail water and sanitation.
    - Tool acquisition, management, and repair.
    - Base camp facilities procurement and maintenance.
  - Think of them as the Quartermaster.


Incident Commander
Safety
Liaison
Public Information
Operations
Planning
Logistics
Finance/ Administration

Finance and Administration Section Chief

In charge of all things with budgets and cost.

Finance/ Administration Section

SummitCorps 2011 Action Plan

SummitCorps Incident Action Plan

Finance/Administration

Executive Summary

Finance/Administration section is responsible for the overall administration and financial operations of the project. Key tasks include registration, trading post, financial operations, and general administrative duties.

Objectives

1. Run an effective and efficient trading post
2. Maintain accurate financial statements and process timely reimbursements
3. Register all staff and guests
4. Provide general administrative support, when needed.

Assumptions

1. Six staff to run trading post and financial operations
2. 3-4 staff to run registration + additional support from other areas

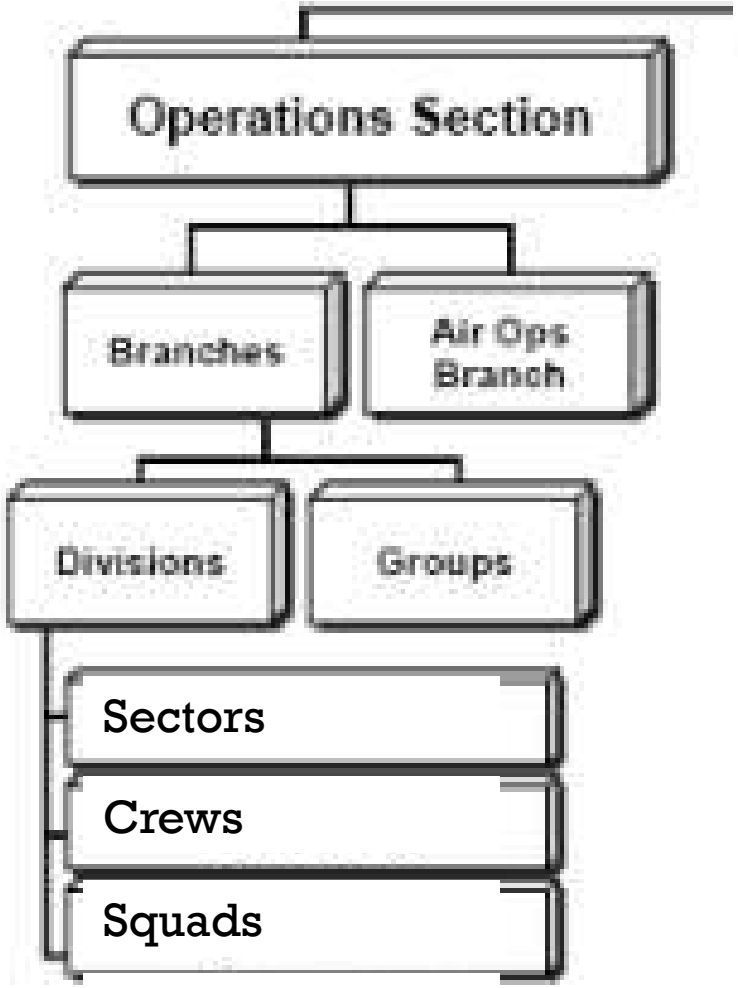
Command Staff (Recap)

- Can all be youth (with advisers).
- Can have a "Joint" Command Staff where the stakeholder (the USFS for example) can also appoint an Incident Commander, and the two IC's work together.
- Incident Commander ("IC") – youth and adviser in charge of the whole project.
- Safety Officer – in charge of making sure all work is planned and carried out safely, with proper safety equipment.
- Public Information Officer – In charge of press releases (a very good idea for a large project – able to generate good press for the BSA.
- Liaisons – Able to interface with other organizations.
  - Added as necessary
    - Media
    - Project-Partners
    - Sponsors

General Staff (Recap)

- Operations Section Chief – In charge of all of the workers.
  - All operations directly applicable to the primary mission of the incident.
- Planning Section Chief – In charge of all aspects of documentation and contingencies.
  - Responsible for collecting, evaluating, and disseminating the tactical information related to the incident, and for preparing and documenting Incident Action Plans ("IAPs").
- Logistics Section Chief – In charge of procuring and maintaining all facilities, services, equipment, and materials.
- Finance and Admin Section Chief – In charge of budgets / money.
  - All financial, administrative, and cost analysis aspects of the incident.

Operations Section



Operations Section (cont.)

- The group that performs all of the physical work for the project.
- Recruiting / Training youth with management skills is essential.
- Maintain 1:5 (ideal), 1:7 (acceptable), 1:10 (max) span of control (1 leader to 5-10 workers) if more than 10 workers report to the same leader then “expand” the operation.
- Branch Directors
  - In charge of no more than 5-10 divisions.
- Division Supervisors
  - In charge of no more than 5-10 sectors.
- Sector Leaders
  - In charge of no more than 5-10 crews/task forces.
- Crew Leaders
  - In charge of no more than 5-10 squads.
- Squad Leaders
  - In charge of no more than 5-10 workers.
- Single Resource
  - A single unit of personnel or equipment.

Operations Section (cont.)

- Branches, Divisions, Sectors, Crews, and Squads can be geographically stationed or grouped by function.
  - Examples: Division A could tasked to complete work in a specific place; or Division A could be all the ambulance drivers.
  - For most BSA projects, geographic stationing works best.
- Crews or Squads can move about in the organizational structure to where they are most needed.
- Crews and Squads can be further designated as either “Strike Teams” or “Task Forces.”
  - A “Strike Team” is “a set number of resources of the same kind and type that have an established minimum number of personnel, common communications, and a leader.”
  - A “Task Force” is “any combination of resources assembled to support a specific mission or operational need. All resource elements within a Task Force must have common communications and a designated leader.”
  - In short, Strike Teams have similar resources while Task Forces have mixed resources.
  - Example: A strike team crew with the tools and experience to build retaining walls might move around, while the general task force crews do tread clearing and finishing.

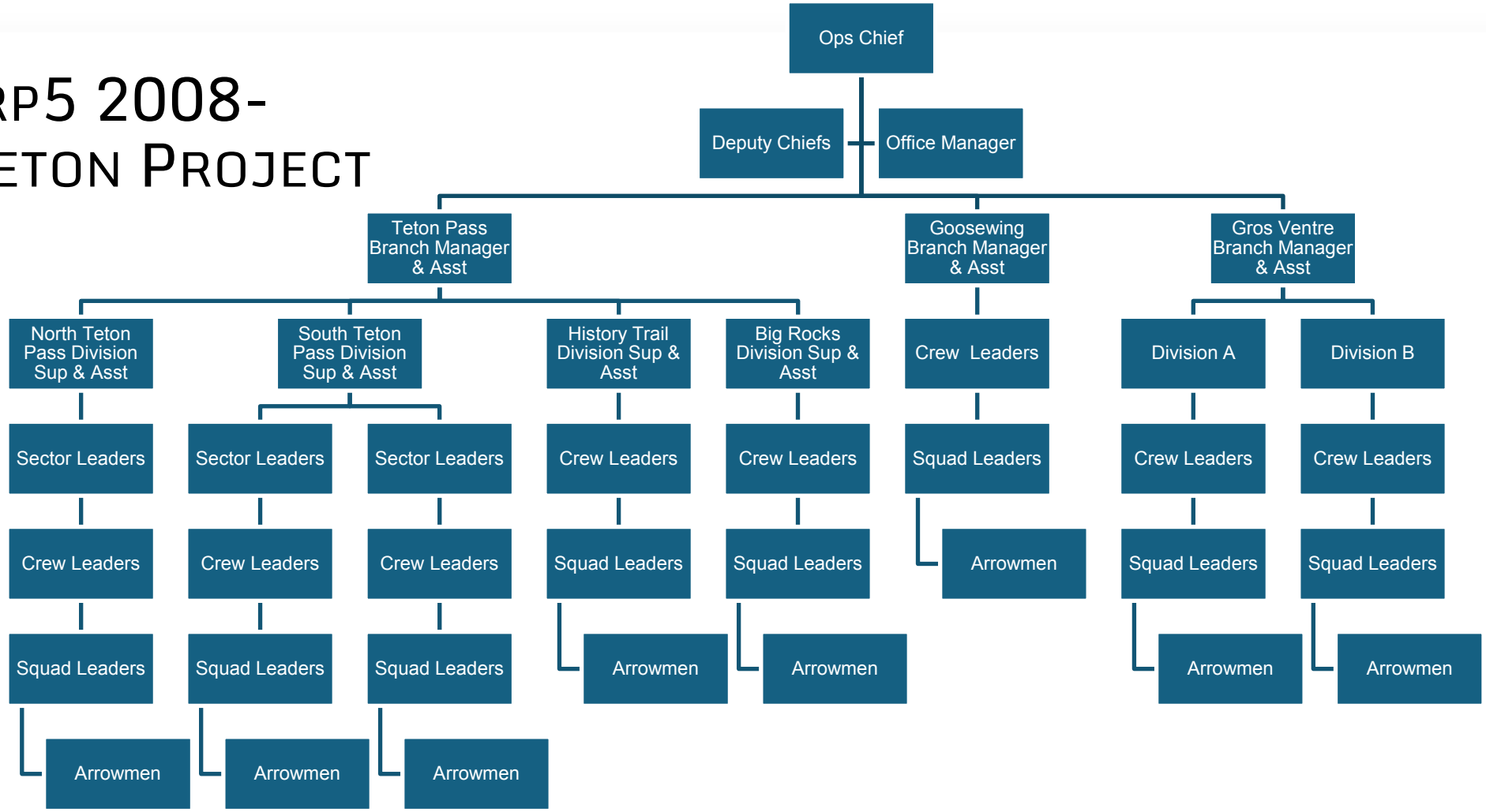
Operations Section (cont.)

ICS-Troop Parallels

- The Incident Commanders are the Senior Patrol Leader and Scoutmaster.
- The Section Chiefs (Operations, Planning, Logistics, Finance are Asst. SPLs).
- The Crew Leader is the Patrol Leader.
- The Squad Leader is the APL or that First Class Scout learning leadership.
- Branches, Divisions, and Sectors not needed due to scale.
  - But if the Incident is a Council Camporee, then individual Troops might then parallel Sectors.
  - And if the Incident is a National Jamboree, Councils might parallel Divisions and Regions might parallel Branches.

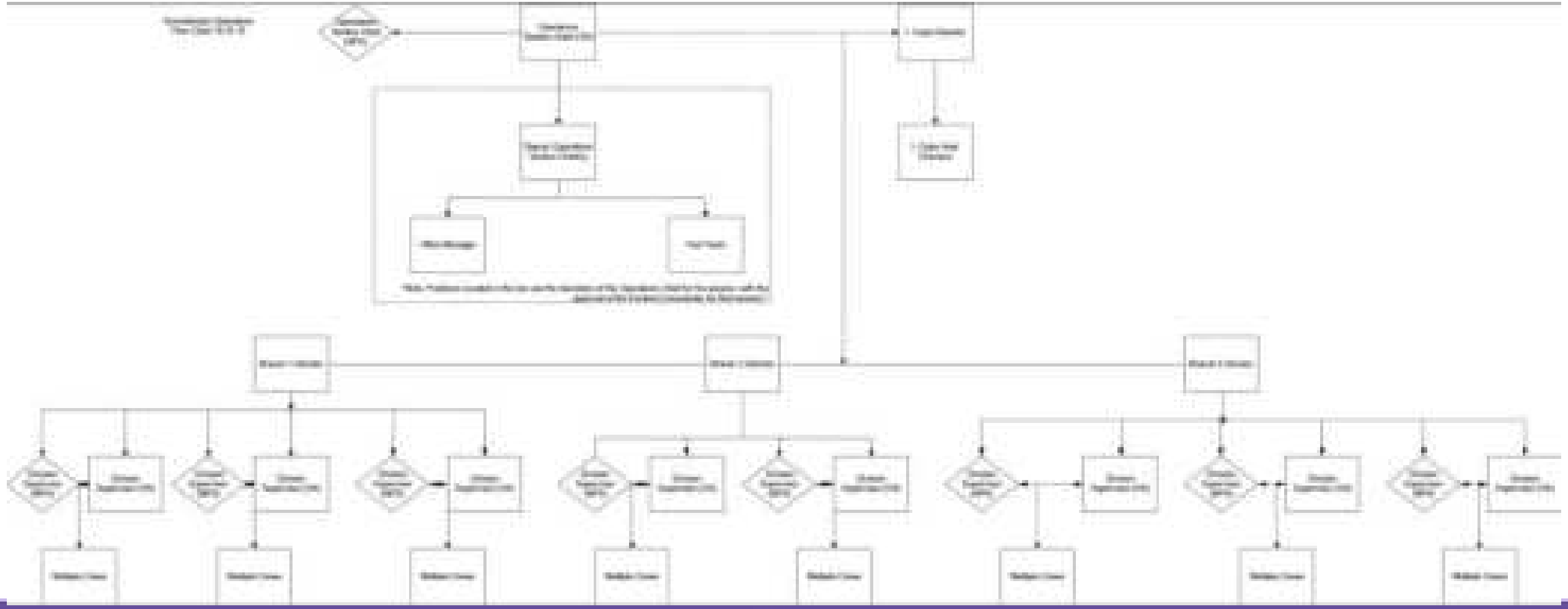
Operations Section (cont.)

ArrowCorp5 2008-Bridger Teton Project



Operations Section (cont.)

SummitCorps 2011 Project



Operations Section (cont.)

Sample Operations Chart: SummitCorps, New River Gorge (cont.)

- Level 1: Operations Section Chief (NPS)
  Operations Section Chief (OA)
- Level 2: Deputy Operations Section Chief (OA)
  - Tool Cache
  - Office
  - Ad Hoc Positions

Operations Section (cont.)

Sample Operations Chart: SummitCorps, New River Gorge (cont.)

- Level 3: Branch Directors
- There will be two (2) branches, with one (1) assigned to Craig's Branch area and one (1) assigned to Garden Ground area. Each Branch will be supported by Divisions and each Division will be supported by Crews within the Span of Control. Crew numbers and totals can be redistributed by individual sessions based on attendance and needs in the field.

  - Branch 1 Director (Craig's Branch)
    - Division A Supervisor
      - Crews (5)
    - Division B Supervisor
      - Crews (5)
    - Division C Supervisor
      - Crews (4)
    - Division D Supervisor
      - Crews (4)
    - Division E Supervisor
      - Crews (4)
  - Branch 2 Director (Garden Ground)
    - Division A Supervisor
      - Crews (6)
    - Division B Supervisor
      - Crews (6)
    - Division C Supervisor
      - Crews (6)

Operations Section (cont.)

Sample Operations Chart: SummitCorps, New River Gorge (cont.)

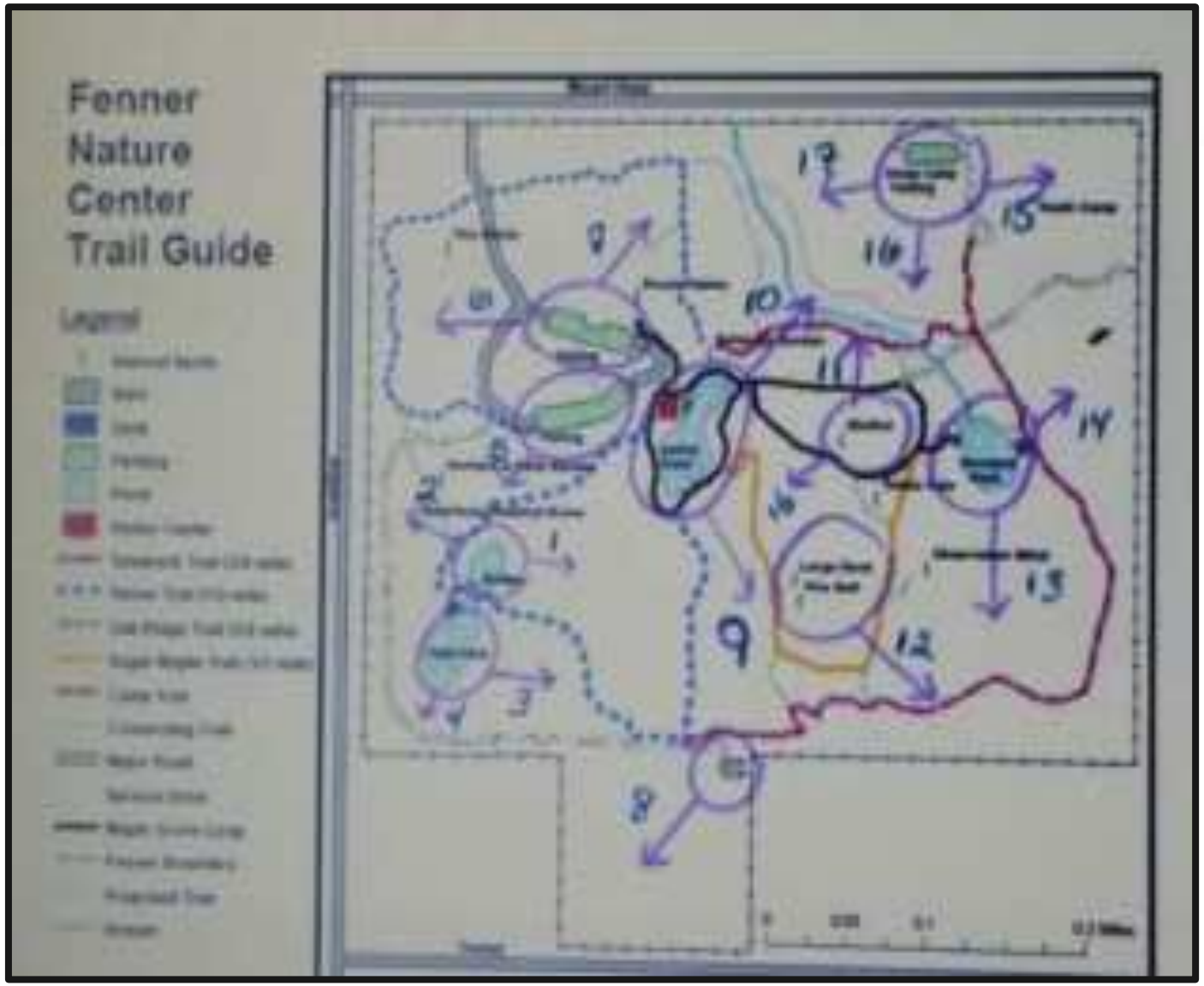
- Level 4: Individual Crews
  - 11 participants will be assigned to Crews.
  - Crews will include an InstructorCorps member (Crew Leader) with 10 participants.
  - 2 youth participants will be designated Squad Leaders with 4 other participants in each squad at the discretion of the InstructorCorps Crew Leader.
  - Crews will be assigned to Divisions and Divisions will be assigned to Branches.
  - Designations will be made by Session (1-, 2-) and numbered sequentially (Crews 1-45).
    - For instance, Crew 3-38 is Session 3, Crew 38.

Deployment Plans

SummitCorps: New River Gorge Craig Branch Deployment Plan

Deployment Plans

2012 NOAC Conversation Project: Fenner Nature Center Trail Deployment Plan



Deployment Plans

2015 NOAC Centennial Conversation Project: Woldumar Deployment Plan

Deployment Plans

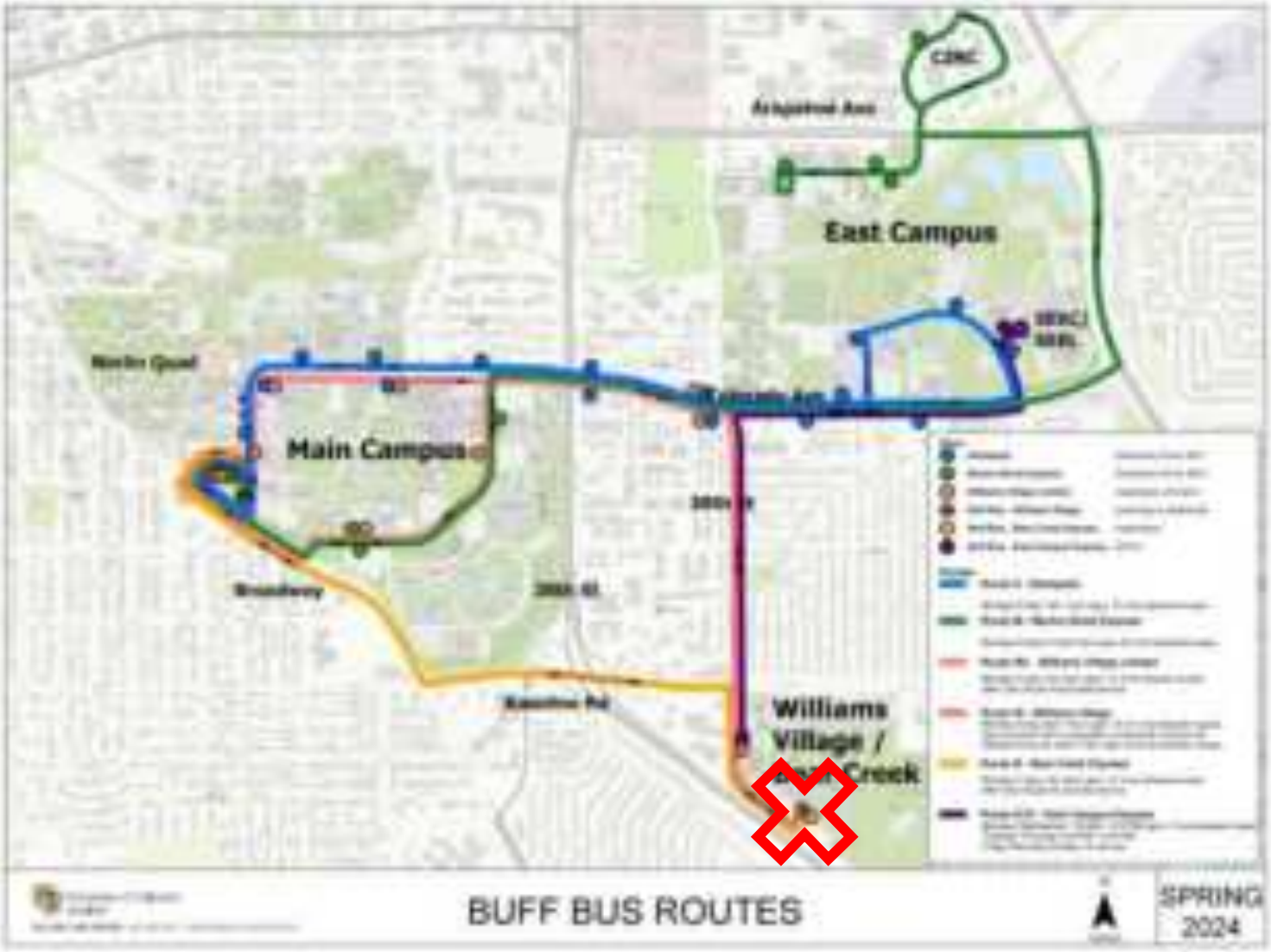
BNRTC 2017

Deployment Plans

2022 NOAC Project:
Ijams Nature Center

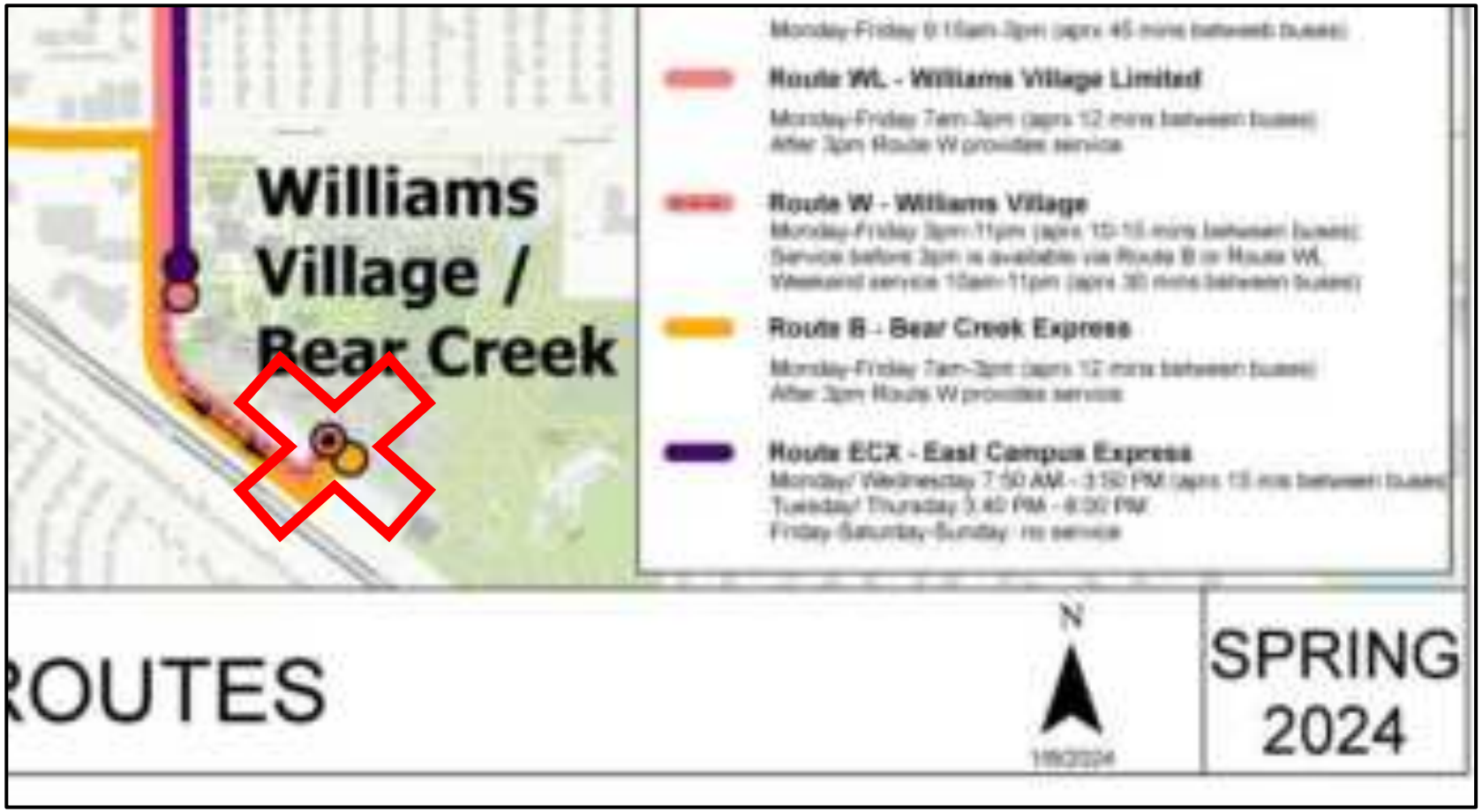
Deployment Plans

2024 NOAC
On-Campus Pickup Location for Service Projects



Deployment Plans

2024 NOAC
On-Campus Pickup
Location for Service
Projects



Deployment Plans

2024 NOAC
Off-Campus Hall
Ranch Deployment
Map

Deployment Plans

2024 NOAC
ACES Projects
Deployment Plan

https://www.dropbox.com/scl/fi/op6x0av0wy6axr087cfbe/NOAC-ACES-Projects-Timeline.xlsx?rlkey=jkitp6rdcaemwupq5daankqx2&dl=0

3.

What does it mean to us?

Benefits of ICS

The Incident Command System (ICS) has positively impacted incident management efforts by:

- Clarifying chain of command and supervision responsibilities
- Leveraging interoperable communications between agencys
- Providing an orderly, systematic planning process.
- Implementing a common, flexible, predesigned management structure.
- Fostering cooperation between diverse disciplines and agencies.

And most importantly.....

Knowing and using ICS at projects allows SCOUTS to be a productive member of the team.

If agencies and organizations know that we can fit into the plan easily than they are more likely to allow or ask us to be there.

Takeaway Challenge

Take the online ICS classes.

https://training.fema.gov/nims/

NOAC 2024

UC Boulder

SEEK NEW HEIGHTS

Being an Effective Crew Leader

Bradley J. Ellis, Esq. • **bradjellis@gmail.com**
Joshua Hipps • **joshua.hipps@gmail.com**

Being an Effective Crew Leader

1. Safety
   - PPE, hydration, hunger, fatigue, weather, time, dangerous wildlife.
2. Moral
   - “Fun is best”; share in the dirty/hard jobs; job rotation.
3. Tools Management
   - Location, proper use, upkeep.
4. Materials Management
   - “ABS” = Always Be Sourcing.
5. Technical Knowledge

Career Opportunities

Lauren Berger Taylor • Lauren.berger.taylor@gmail.com

Career Opportunities

You Can Now Go to College For Trail Building—And It's About Time

"Around the country, land managers are clamoring for new trails, but workers are scarce. New college programs and higher wages could help solve the trail work industry's labor crisis."

- BACKPACKER MAGAZINE; PUBLISHED JUL 10, 2024 (HTTPS://WWW.BACKPACKER.COM/STORIES/SHORTAGE-TRAIL-BUILDERS-THESE-PROGRAMS-CAN-HELP/)

Volunteer Opportunities

Trainer Name• **email**

Scouting for SDG's
Do you know what the SDGs (Sustainable Development Goals) are?

Scott Anderson

National Chair, Outdoor Ethics & Conservation Subcommittee

Outdoor Ethics & Conservation Subcommittee

Supports the inclusion of outdoor ethics, conservation, and ecology in all Scouting programs, and provides guidance to sustainably manage the natural resources of our treasured properties for current and future generations of Scouting youth.

What are the SDGs (Sustainable Development Goals)

THE SUSTAINABLE DEVELOPMENT GOALS

World Organization of the Scouting Movement

54 Million Youth Take Action

BETTERWORLD framework

The Better World Framework was developed by the World Organization of the Scout Movement in partnership with the United Nations as part of the Sustainable Development Goals initiative. It allows Scouts to become global citizens and take action to create a better world.

SCOUTS *for* SDGs

SCOUTS *for* SDGs

SCOUTS®
Creating a Better World

SDG Thematic Areas

Environment and Sustainability

Peace and Community Engagement

Skills for Life

Health and Well-Being

SDG Thematic Areas

Environment and Sustainability

Peace and Community Engagement

Skills for Life

Health and Well-Being

SDG Thematic Areas

Environment and Sustainability

Peace and Community Engagement

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Environment and Sustainability

Peace and Community Engagement

Skills for Life

Program in Development

Health and Well-Being

Program in Development

SDG Thematic Areas

Environment and Sustainability

Peace and Community Engagement

Skills for Life

Program in Development

Health and Well-Being

Program in Development

What Can Scouting America Do?

Scouting America

Scouting America's International Committee

SCOUTS for SDGs

MESSENGERS OF PEACE

https://www.scouting.org/international/messengers-of-peace/

Want to
become a
MESSENGER
of PEACE?

Scouts for SDGs Workgroup

A collaboration between the Scouting America's International Committee and the Outdoor Ethics & Conservation Subcommittee.

Supports the inclusion of the UN's Sustainable Development Goals in Scouting.

Scouts for SDGs Workgroup

SCOUTS for SDGs

Scouts for SDGs Workgroup

SCOUTS for SDGs

Eco Anxiety

Eco Anxiety

“the generalized sense that the ecological foundations of existence are in the process of collapse.”

Pihkala Panu (2020). "Anxiety and the Ecological Crisis: An Analysis of Eco-Anxiety and Climate Anxiety". *Sustainability*. **12** (19): 7836. doi:10.3390/su12197836. hdl:10138/348821.

"the chronic fear of environmental cataclysm that comes from observing the seemingly irrevocable impact of climate change and the associated concern for one's future and that of next generations"

The **American Psychological Association** (**APA**)

Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey

Avaaz study published December 2021 in Lancet

Survey 10,000 (16 -25 year olds)

10 Countries (Australia, Brazil, Finland, France, India, Nigeria, Philippines, Portugal, the UK, and the USA)

1000 per country

https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(21)00278-3/fulltext

Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey

From the Summary

- 59% were very or extremely worried about climate change
- 84% were at least moderately worried about climate change
- > 50% reported each of the following emotions: sad, anxious, angry, powerless, helpless, and guilty.
- > 45% of respondents said their feelings about climate change negatively affected their daily life and functioning
- 75% said that they think the future is frightening
- 83% said that they think people have failed to take care of the planet

Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey

From the Summary

Climate anxiety and distress were correlated with perceived inadequate government response and associated feelings of betrayal.

How to Help Teens Overcome Anxiety About Climate Change

BY TYRALYNN FRAZIER | JUNE 26, 2023

Greater Good Magazine

SCIENCE-BASED INSIGHTS FOR A MEANINGFUL LIFE

"By engaging in compassionate action, individuals may feel more empowered and effective in their efforts to address climate change, which can in turn reduce feelings of helplessness and hopelessness."

How to Help Teens Overcome Anxiety About Climate Change

What Can Scouting America Do?

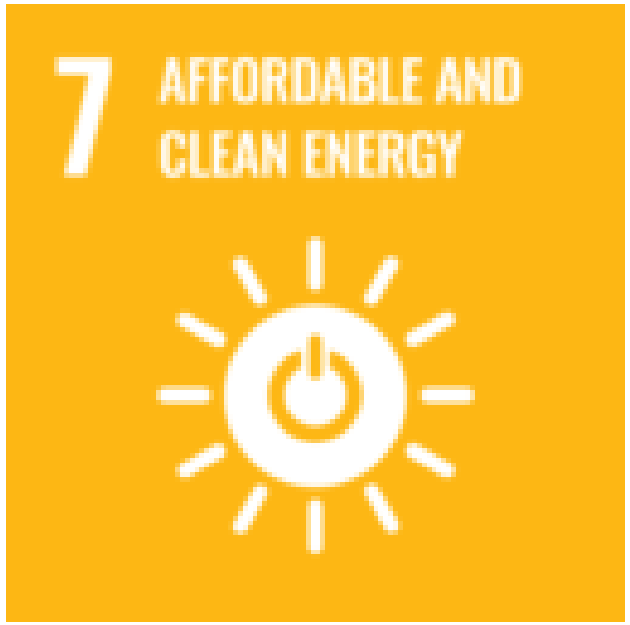
Through a series of program initiatives we can empower Scouts at all levels to take ACTION!

What is Scouting America Already Doing?

Scouting America and the SDG's

- Conservation Service to Clean our Water Resources
- Leave No Trace Practices to Protect our Water Resources
- Leave No Trace Practices to Dispose of Our Waster Properly
- Soil & Water Conservation Merit Badge Merit Badges

Scouting America and the SDG’s



- Sustainability Merit Badge
- Solar in camp: Energy, Environment and Education

Scouting America and the SDG's

- Sustainability Merit Badge
- Service Projects
  - Building Pollinator Gardens
  - Clean-Ups
  - Distribution of Water Saving Shower heads

Scouting America and the SDG's

- A Scout is Thrifty
- Sustainability Merit Badge
- Reduce, Reuse, Recycle

Scouting America and the SDG's

- Disguised Conservation Service Award
- Environmental Science Merit Badge
- Emergency Preparedness Merit Badge
- Weather Merit badge
- Conservation Good Turn Projects

Scouting America and the SDG's

- Nature Education
- Service Projects to Clean our Water Resources
- Leave No Trace practices to Protect our Water Resources
- Florida Sea Base - Coral Reef Restoration
- Reduce Plastic Consumption
- Catch & Release Fishing Practices

Scouting America and the SDG's

- Nature Education
- Service Projects to Build Wildlife Habitats
- Service Projects to Remove Invasive Species
- Leave No Trace Practices to Respect Wildlife

New Scouting America Programs

New Scouting America Program

Scouting for Clean Waterways is a nationwide initiative that empowers Scouts and Councils to take action against waterway and marine debris. Through a multi-faceted approach, Scouts will be encouraged to:

- Engage in community service to clear debris from our waterways
- Learn how to reduce consumption.
- Learn the importance of proper waste disposal
- Participate in a citizen science program
- Share their stories

New Scouting America Program

https://blog.scoutingmagazine.org/2024/06/06/announcing-scouting-for-clean-waterways-a-new-conservation-program-for-all-scouts/

New Scouting America Programs In Development

earthtribe

- Launched by the World Organization of the Scouting Movement (WOSM) in June 2020
- Educational initiative that unites young people in a global youth movement for environmental action.
- Earth Tribe is offered as a complementary component of Scouting's Youth Programme, replacing the long-standing World Scout Environment Programme, and is part of a wider collective mobilization through Scouts for SDGs to engage young people in making the world's largest youth contribution towards the Sustainable Development Goals (SDGs)

The Earth Tribe is a personal educational journey for environmental change - a global community of friends who share your passion and leadership to create a better world!

Want to know more about Earth Tribe go to

https://earthtribe.scout.org/

earthtribe®

Better Choices
Developing sustainable consumption habits towards an eco-friendly and healthy lifestyle
Nature and Biodiversity
Connecting with nature and protecting it for sustainability
BE AWARE - COOPERATE - ACT
Clean Energy
Exploring and adopting sustainable energy options
Healthy Planet
Preventing and recovering water and land ecosystems from pollution
Young people
Individuals
Earth Tribe
As a global community

earthtribe®

Better Choices

Developing sustainable habits towards eco-friendly and healthy lifestyles

This learning path helps young people to reflect on the everyday impact their choices and actions have on their immediate surrounding environment. Through this path, young people will develop their own ideas on how their community and its consumption patterns can be designed and adapted to contribute to a more sustainable lifestyle.

earthtribe®

Nature and Biodiversity

Connecting with nature and protecting it towards sustainability

Humans and nature are interdependent. Nature and biodiversity is an important learning environment for outdoor skills and discovery of the great outdoors. This learning path enables young people to understand how ecosystems underpin the web of life and also provide nourishment in the form of food, act as water catchment areas, offer homes to a multitude of species, and serve as a balance for carbon removal. Young people will develop their own ideas on how the different demands towards nature can be balanced.

earthtribe®

Clean Energy

Exploring and adopting sustainable energy options

Climate change is one of the most pressing challenges of our time facing society and young people. Climate change is mostly driven by our high demand for energy resources, including by-products from agriculture and forestry to produce energy. This strain puts responsibility on everyone individually to make changes towards a better solution. In this learning path, young people will reflect on their impact on the climate and their use of energy sources. Young people will explore new possibilities for sustainable energy and other practices to mitigate climate change.

earthtribe®

Healthy Planet

Preventing and recovering water and land ecosystems from pollution

Young people thrive towards creating a better world for others and themselves. Understanding how pollution impacts the planet, identifying and challenging practices conducive to increasing pollution, and how to reduce its effects, implementing waste management is one aspect of this learning path. Land ecosystems, lakes, rivers, and oceans provide food and water for all of us, but are heavily impacted by careless pollution, and young people will work with the community, local organizations and partners to reduce, reuse and recycle waste, e.g. single-use plastics.

earthtribe

For each Learning Path Scouts develop their competencies.

Advocate for better choices and a healthy lifestyle	Young people adopt and advocate for meaningful habits towards developing an eco-friendly and healthy lifestyle.
Champion of nature and biodiversity through sustainability	Young people understand ecosystems and connect with nature, and adopt sustainable practices in protecting natural resources.
Innovator for clean energy and climate change by adopting sustainable energy options	Young people understand the impact of energy usage in climate change, and advocate for the adoption of sustainable energy options.
Healer for a clean and healthy planet: building practices to address pollution.	Young people engage in designing solutions and engaging in action to prevent pollution and recover water and land ecosystems.

earthtribe

Challenge	A long-term effort with a specific agenda, goals, and processes aimed to develop key competencies in young people. Challenges include multiple elements to ensure the knowledge, attitudes and behaviours, supported by a network.	E.g.: Tide Turners Plastic, Scouts Go Solar, Champions for Nature, others from NSOs or NSAs or external organisations.

BSA Excellence
Ecology Conservation & Environmental Ethics

Questions?

“Nature study is the key activity in Scouting…”

Sir Robert Baden-Powell

NOAC 2024

UC Boulder

SEEK NEW HEIGHTS

Scouting's Conservation & Outdoor Ethics Awards

Ted Weiland• ted.weiland@gmail.com

Conservation Awards

- World Conservation Award
  - Environmental Science OR Sustainability
  - Soil and Water Conservation OR Fish and Wildlife Management
  - Citizenship in the World

- National Park Service Scout Ranger Program
  - 10 hours of service projects at a National Park

- Keep America Beautiful Hometown USA Award
  - 3 merit badges from preapproved list
  - 8 hour service project

Conservation Awards

- Conservation Rocker Patch
  - 25 hours of conservation work
  - Similar merit badges to World Conservation Award
  - 1st Class Rank and knowledge of common conservation tools

- Conservation Good Turn Award
  - Plan and carry out conservation project on a public or camp property

Distinguished Conservation Service Award

- Distinguished Conservation Service Award (Youth)
  - 2 major conservation service projects
  - Work with local council conservation committee
  - Scouts BSA: merit badges
  - Venturing/Sea Scouts: program specific
  - Has workbook similar to Eagle Scout
  - Recipients can be entered for a scholarship from the Campfire Club!

Distinguished Conservationist and Certificate

- Distinguished Conservationist (Adult)
  - 20 years of service at regional, national, or international level
- DCSA Certificate
  - Can recognize organization or individuals

Outdoor Ethics Awards

- Awareness Award
  - An introduction to some of the key concept of Outdoor Ethics
  - Most of it can be completed online
- Action Award
  - Complete the Awareness Award
  - Take your interest to the next level by teaching others!

Takeaway Challenge

Learn more these awards!
Earn and/or promote these awards in your council and lodge.

National Outdoor Ethics & Conservation Conference 2024

- September 12-14, 2024
  - Pre-conference activities starting September 9th
- Camp Tracy, UT
  - Outside Salt Lake City
- Cost is $225
- Cabins available for extra fee, otherwise bring tent & sleeping bag!

NOAC 2024

UC Boulder

SEEK NEW HEIGHTS

Trail Building

Basic Trail Concepts

Bradley J. Ellis, Esq. • **bradjellis@gmail.com**
Joshua Hipps • **joshua.hipps@gmail.com**

Basic Trail Concepts

(1) Survey

(2) Pioneer

(3) Rough Cut

(4) Finish

(5) Maintain

Surveying

- Slope (aka Grade) = Rise/Run
  - May be stated in either degrees or in percent.
    - When stated in percent, is termed the "Percent Grade."
  - "The 10% Rule"
    - To avoid erosion and create a sustainable trail, the slope should normally be less than 10%—even in steep terrain.
    - The 10% Rule should be adhered to whenever possible, unless:
      - A steep natural terrain in a portion of your trail prohibits compliance, or
      - A greater slope is desired for a specific technical feature for wheeled users on a wheeled user only trail.

Basic Trail Concepts

(1) Survey

(2) Pioneer

(3) Rough Cut

(4) Finish

(5) Maintain

Surveying (cont.)

- Slope (aka Grade) = Rise/Run
  - Grades less than 7% in all soils are ideal, but in sandy soils are almost a necessity to prevent erosion.
  - In flatter areas, trail should be located so that there is some grade to provide for proper drainage.
  - A grade should undulate gently to provide natural drainage and to eliminate monotonous level stretches and long, steep grades that are tiring to trail users.

Basic Trail Concepts

(1) Survey

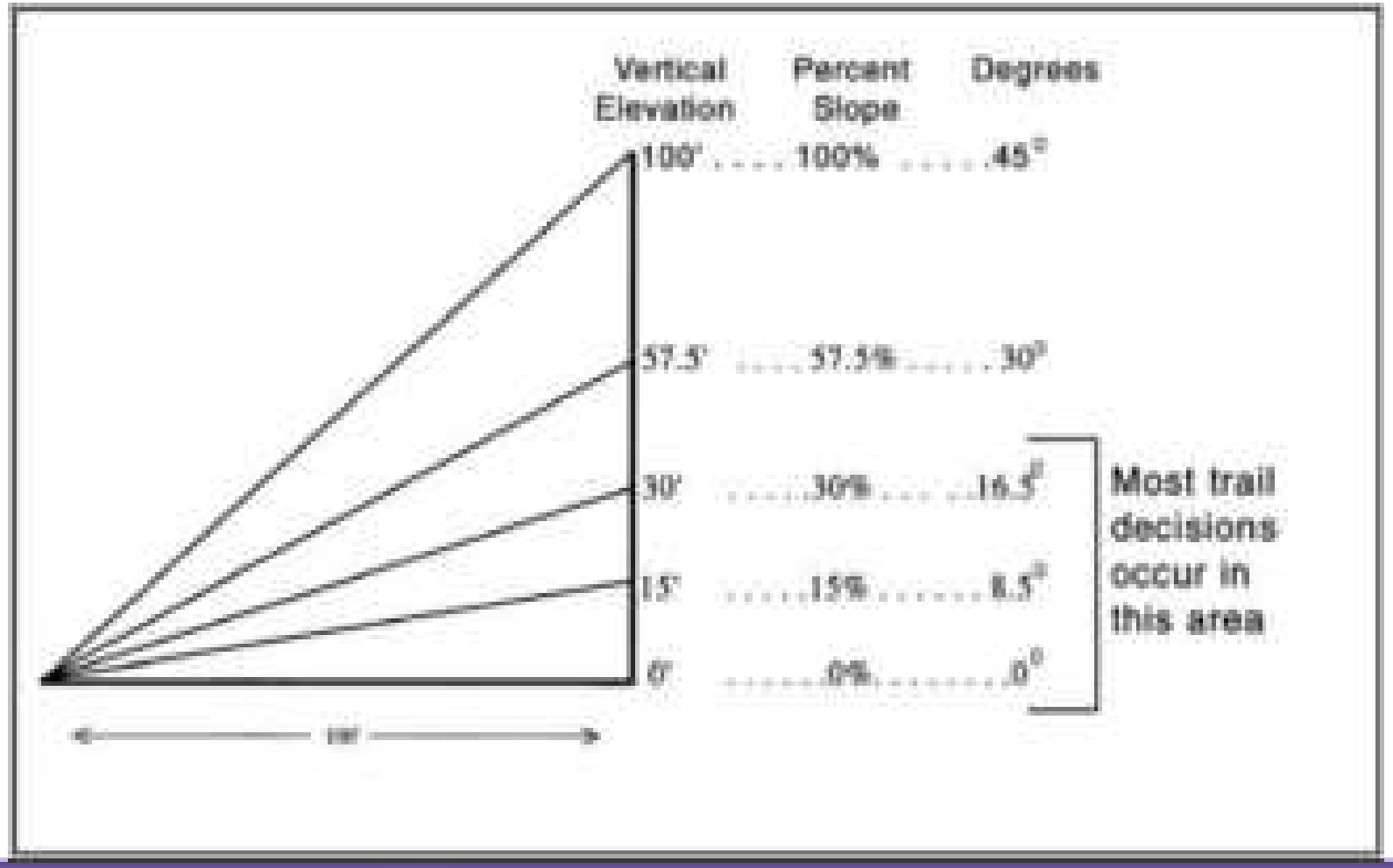
(2) Pioneer

(3) Rough Cut

(4) Finish

(5) Maintain

Surveying (cont.)



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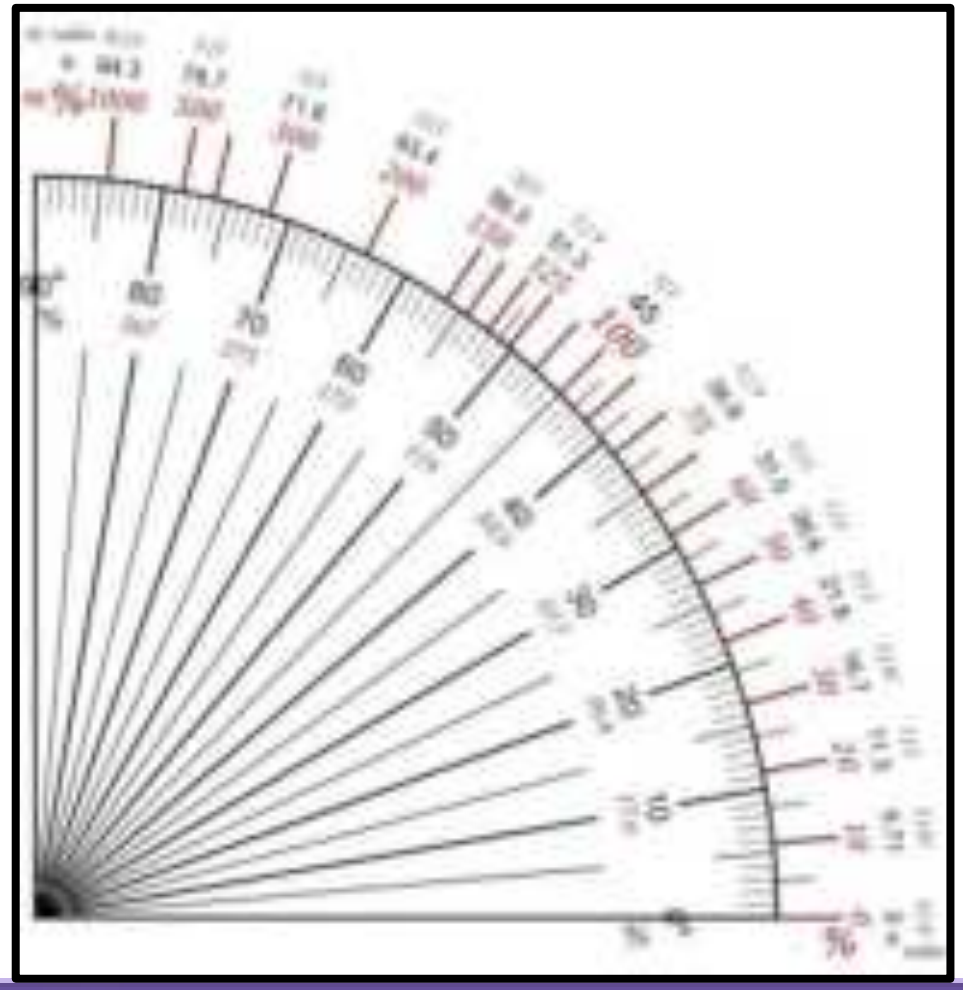
Surveying (cont.)



Basic Trail Concepts

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(5) Maintain

Surveying (cont.)

- "Maximum slope/grade" is defined as the steepest section of the trail that is more than approximately 10 feet in length.

- "Average slope/grade" is the steepness of the trail over its entire length.
  - Average grade can be calculated by taking the total elevation gain of the trail, dividing by the total distance, multiplied by 100 to equal a percent grade.

- Flagging/Staking – place flags/stakes at the down-slope critical edge of the intended tread.

Basic Trail Concepts

(1) Survey

(2) Pioneer

(3) Rough Cut

(4) Finish

(5) Maintain

Surveying (cont.)

- Contours
  - A contour trail gently traverses a hill or side-slope.
  - It's characterized by a gentle grade and a tread that out-slopes slightly toward the low side.
  - These features minimize tread erosion by encouraging sheet flow of water across the trail.
  - "The Half Rule"
    - The half rule says that the trail grade should be no more than half the side-slope grade.
    - This rule really helps when putting trails on gentle side-slopes.
    - For example, if you're working on a hill with a 6-percent side-slope, your trail grade should be no more than 3 percent.
    - If the trail is any steeper, it will be a fall-line trail.
      - Fall-line trails let water funnel down, causing erosion and ruts.
    - As side-slopes get steeper, trails designed using the half rule can be too steep.
    - Use your judgment and knowledge of the particular area.

Basic Trail Concepts

(1) Survey

(2) Pioneer

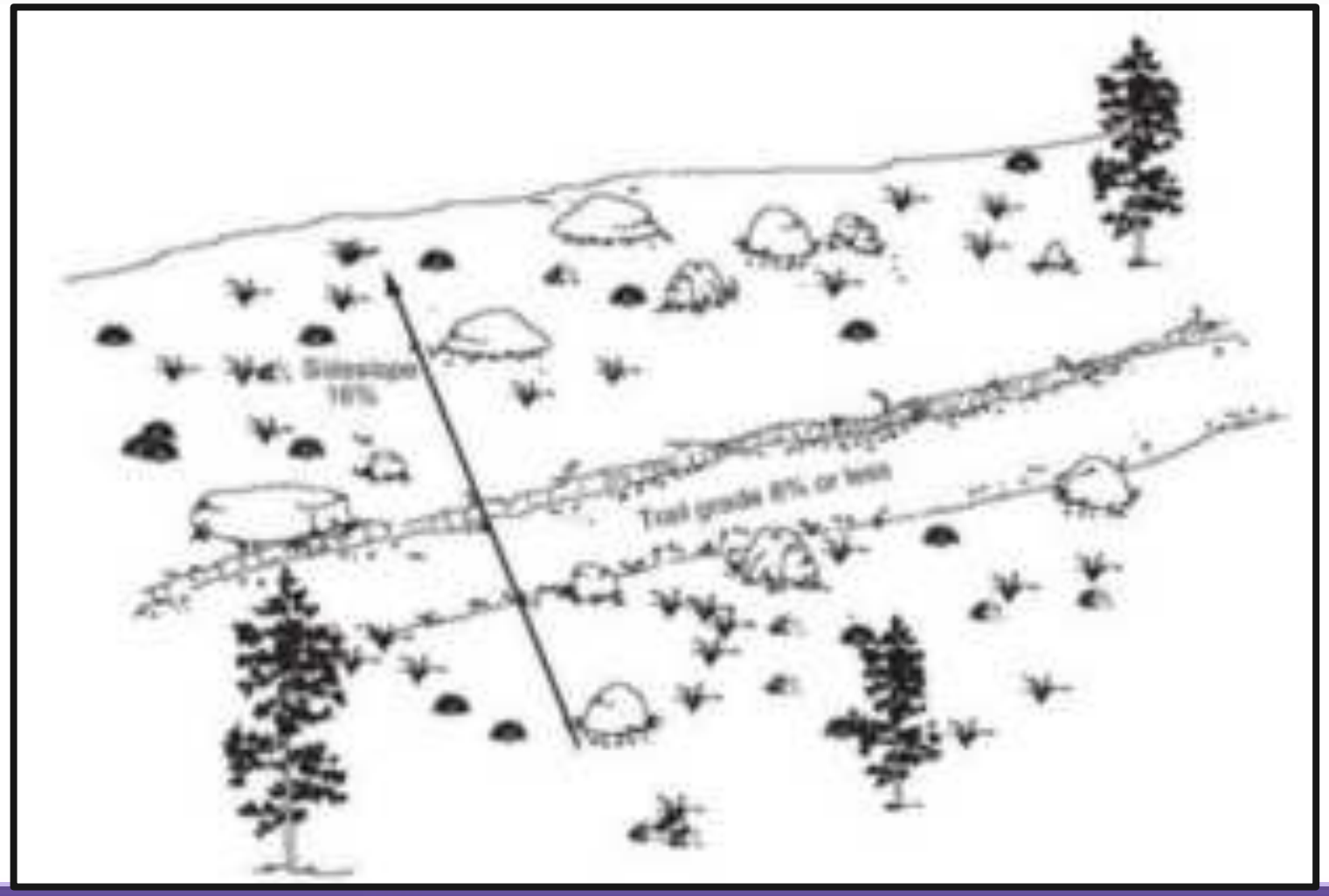
(3) Rough Cut

(4) Finish

(5) Maintain

Surveying (cont.)

"Half Rule" Diagram



Basic Trail Concepts

(1) Survey

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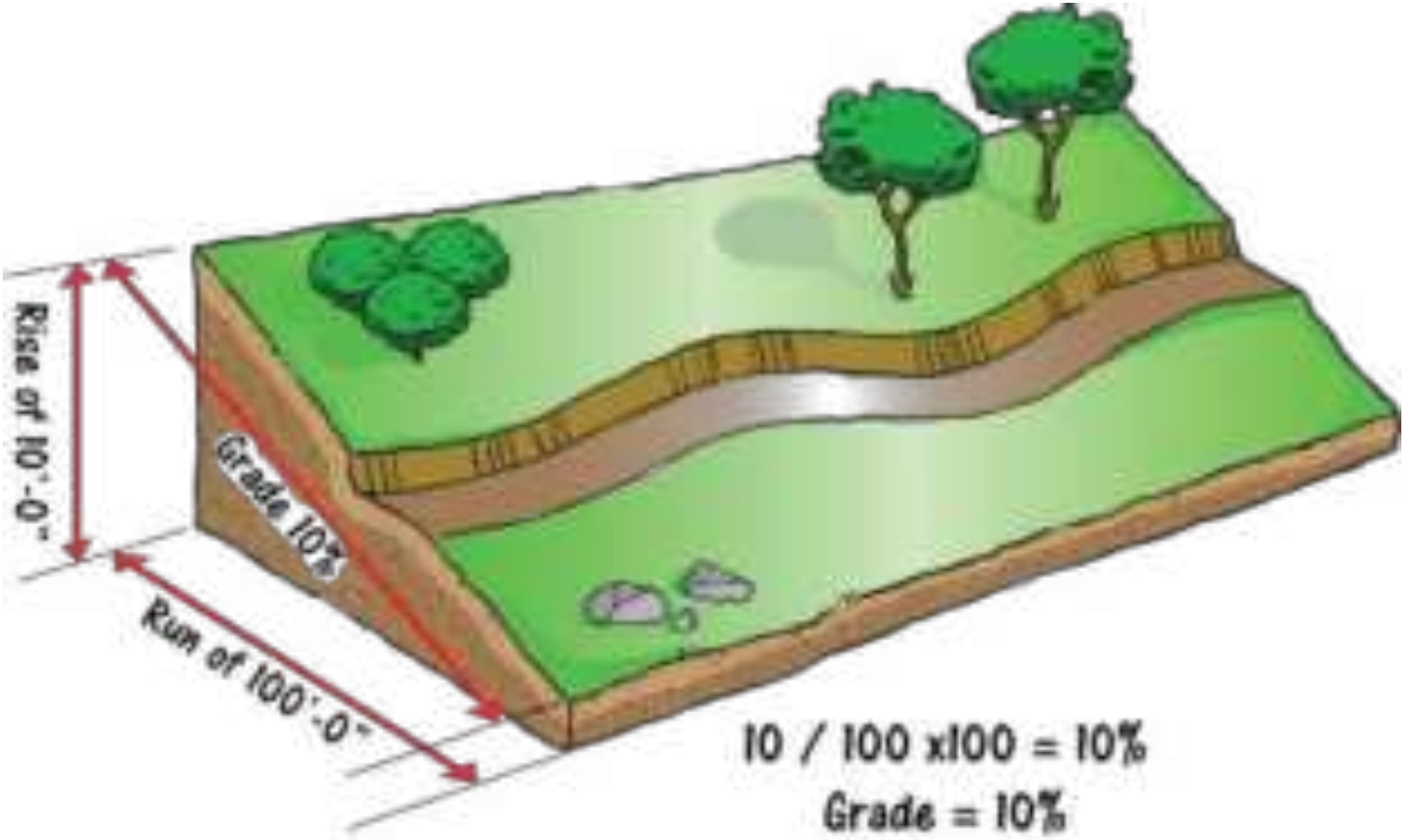
Surveying (cont.)

Sideslope Grade Diagram



Basic Trail Concepts

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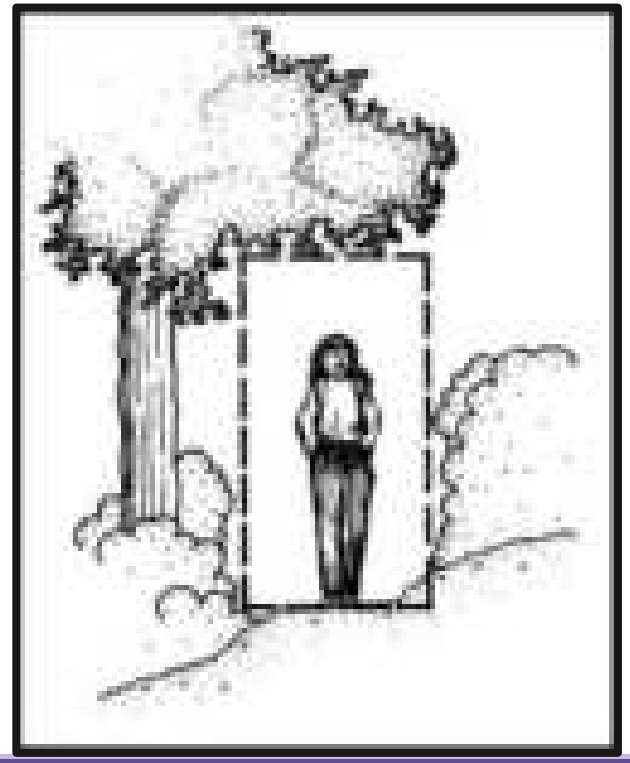
(4) Finish

(5) Maintain

Pioneering

- Clearing the flag/stake line
- Creating a corridor

The desired corridor depends on the trail's intended use(s).



Basic Trail Concepts

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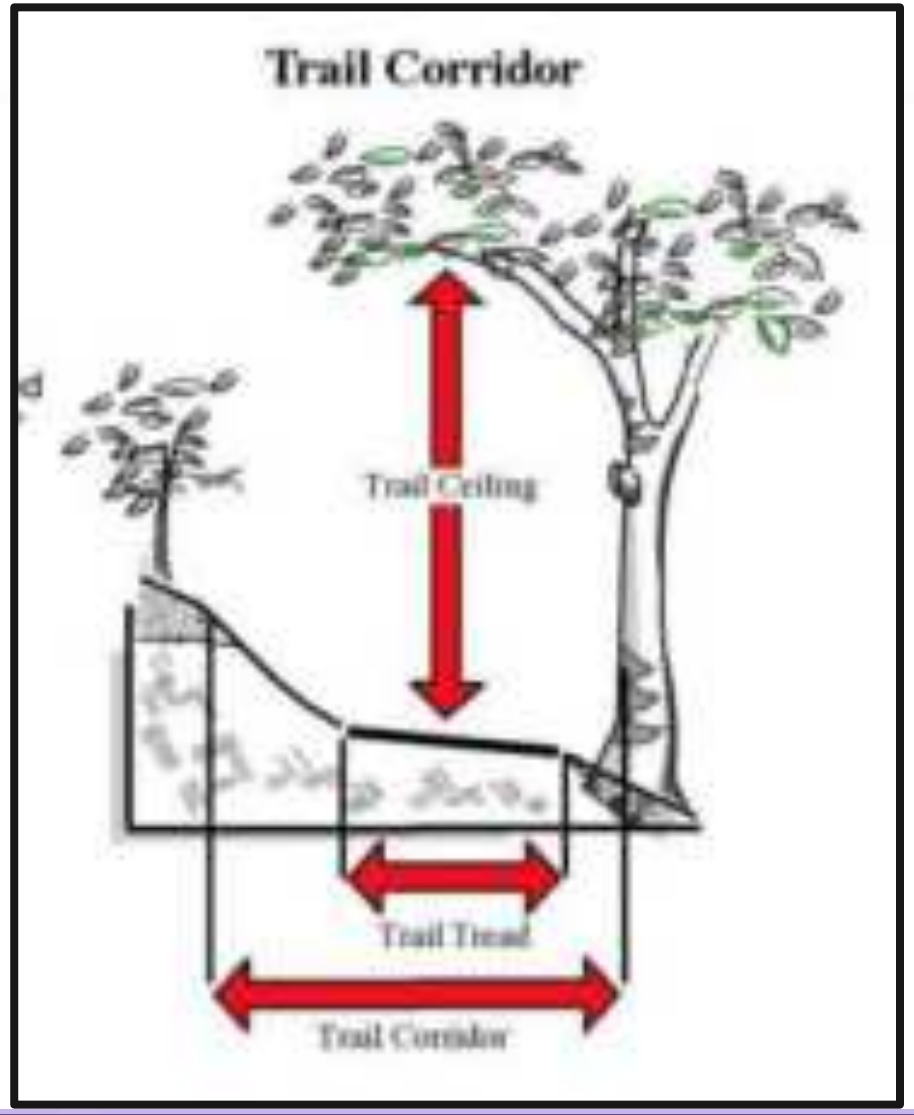
Pioneering (cont.)



Basic Trail Concepts

(1) Survey

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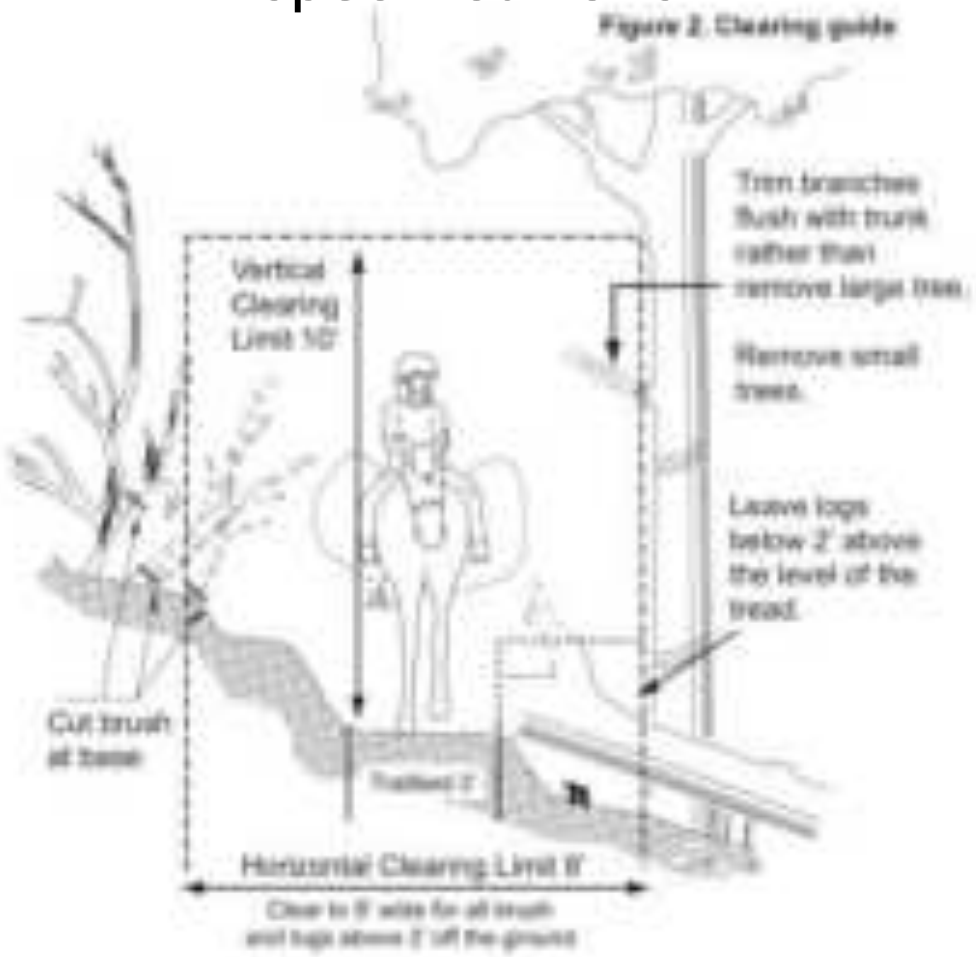
(4) Finish

(5) Maintain

Pioneering (cont.)

Example equestrian clearing specifications



Basic Trail Concepts

(1) Survey

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(4) Finish

(5) Maintain

Pioneering (cont.)

BWCAW clearing specifications for OAWV

- 8 feet wide
- 12 feet high
  - Most portgagers angle the bow of the canoe upward, which results in a 10-12 foot high reach.
- Trim all the way around the tree at the same level trimmed for the corridor.
  - Prevents trees from being damaged due to lopsided snow coverage.
- Cut branches a few inches out from the trunk to prevent sores.

Basic Trail Concepts

(1) Survey

(2) Pioneer

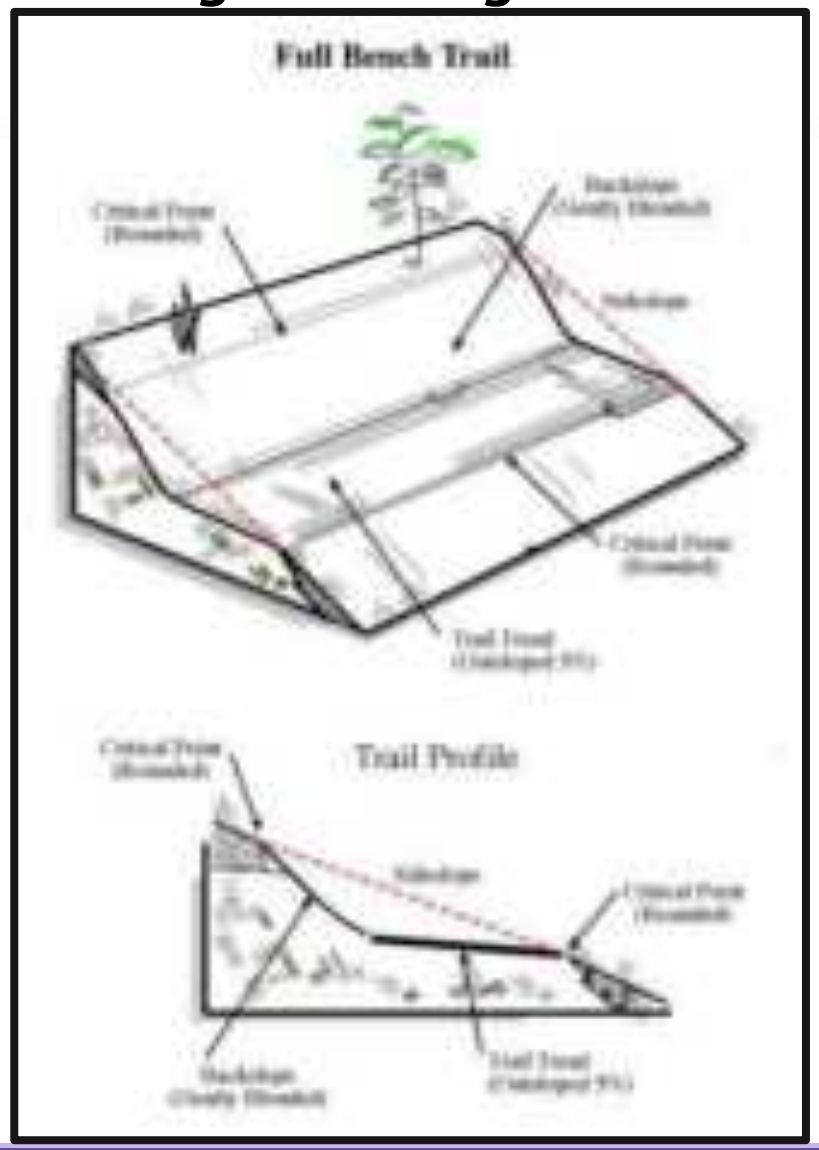
(3) Rough Cut

(4) Finish

(5) Maintain

Pro-Tip: Do not step on, walk on, or even rough cut the outslope critical edge (aka critical point) until the rest of your rough cutting is finished. If you prematurely do any of the foregoing, the critical edge will collapse, resulting in your tread width narrowing, and forcing you to cut more backslope (the critical edge will continue to collapse in a horrible cycle). You will also prematurely loose your flag-line point of reference. Once your tread and backslope are rough-cut and your tread is mildly compacted from use, you can shape your tread out to the outslope critical edge.

Rough Cutting (cont.)



Basic Trail Concepts

(1) Survey

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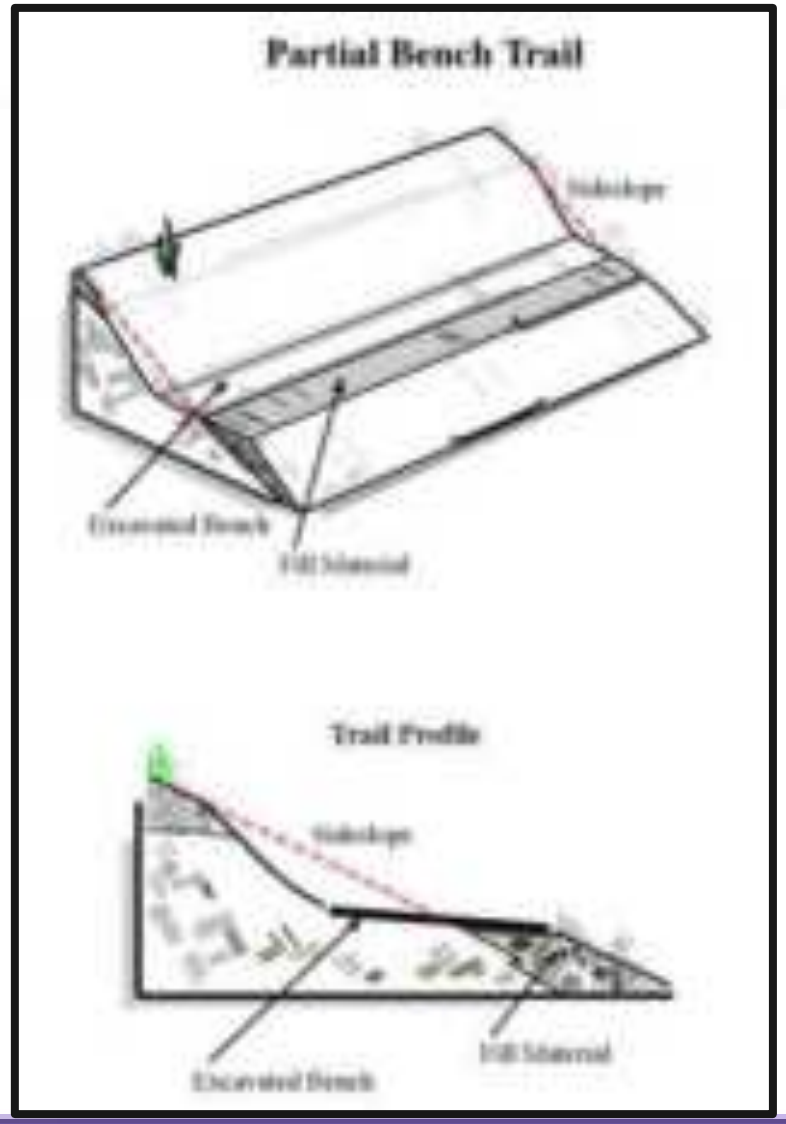
Rough Cutting (cont.)



Basic Trail Concepts

(1) Survey

(2) Pioneer

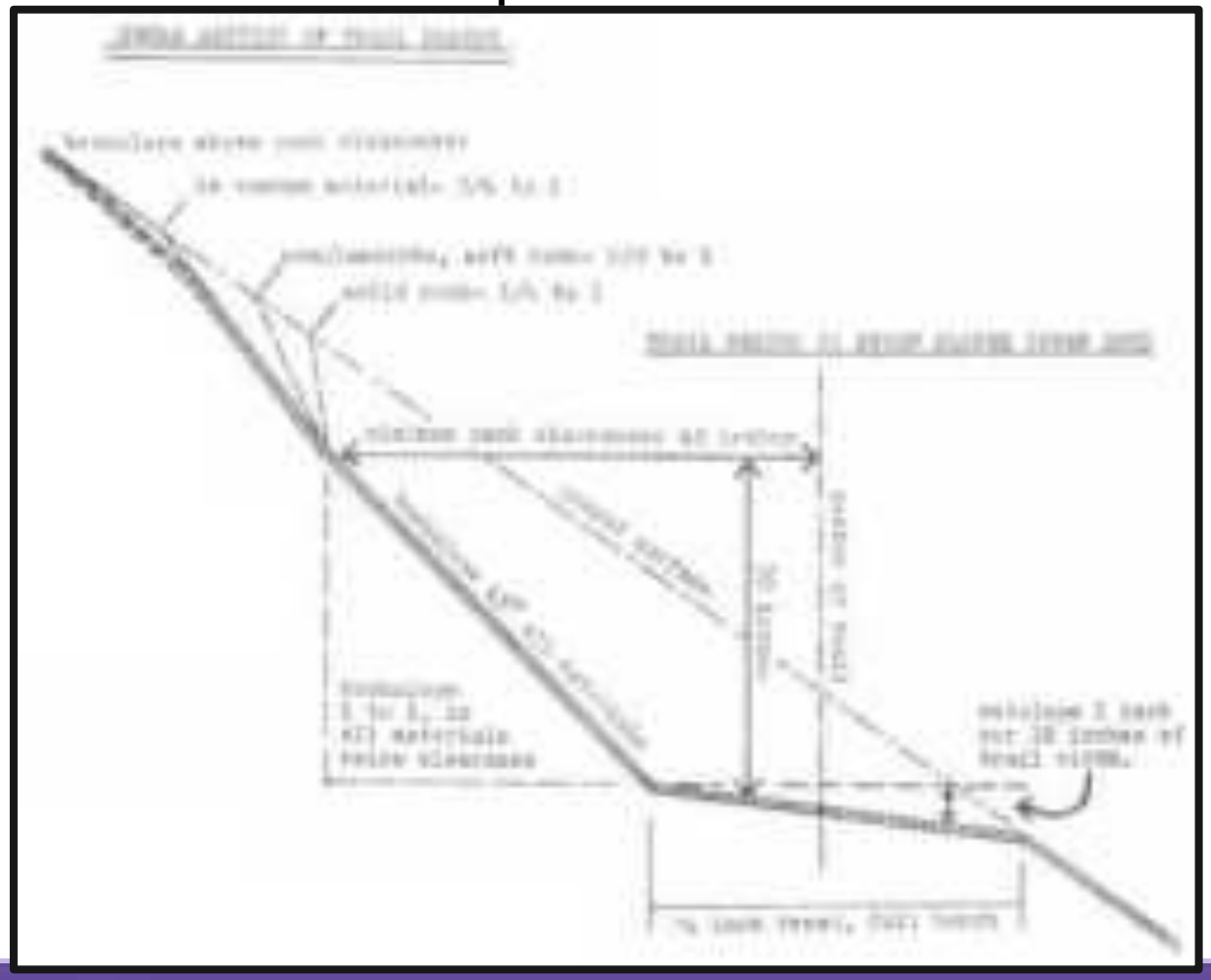
(3) Rough Cut

(4) Finish

(5) Maintain

Rough Cutting (cont.)

OATC Bench Specifications for Steep Sideslopes (over 20%)



Basic Trail Concepts

(1) Survey

(2) Pioneer

(3) Rough Cut

(4) Finish

(5) Maintain

- Finishing grade.
- Solid compaction.
- Positive Drainage.
- Trail Features (as necessary).

Finishing

Picture: Completed ArrowTrail at the ArrowCorps5 (2008) Bridger-Teton Site.

Basic Trail Concepts

(1) Survey

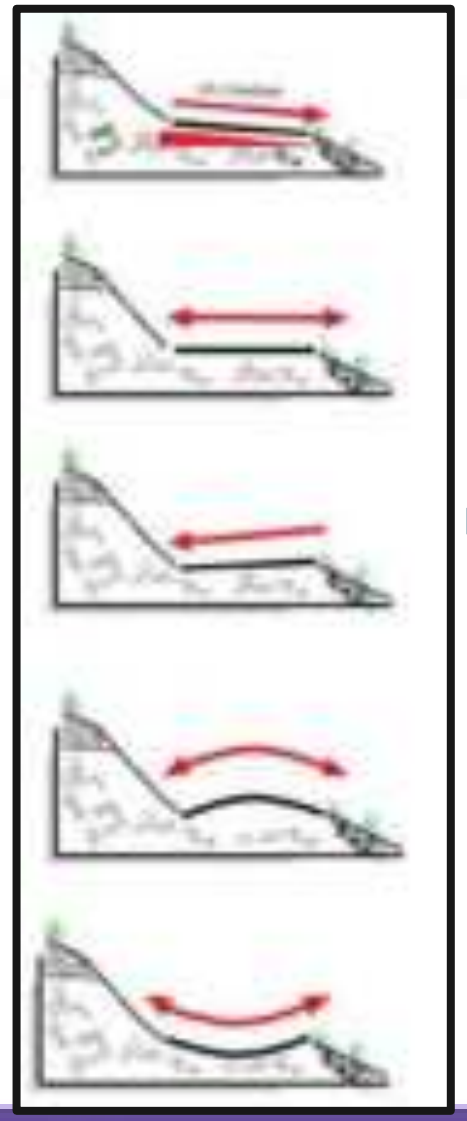
(2) Pioneer

(3) Rough Cut

(4) Finish

(5) Maintain

Finishing (cont.)



YES!

NO!

Usually no, unless in-slope drainage is designed (e.g. some Turns, or Switchbacks).

No in all cases, except for Turnpikes.

NO!

Basic Trail Concepts

(1) Survey

(2) Pioneer

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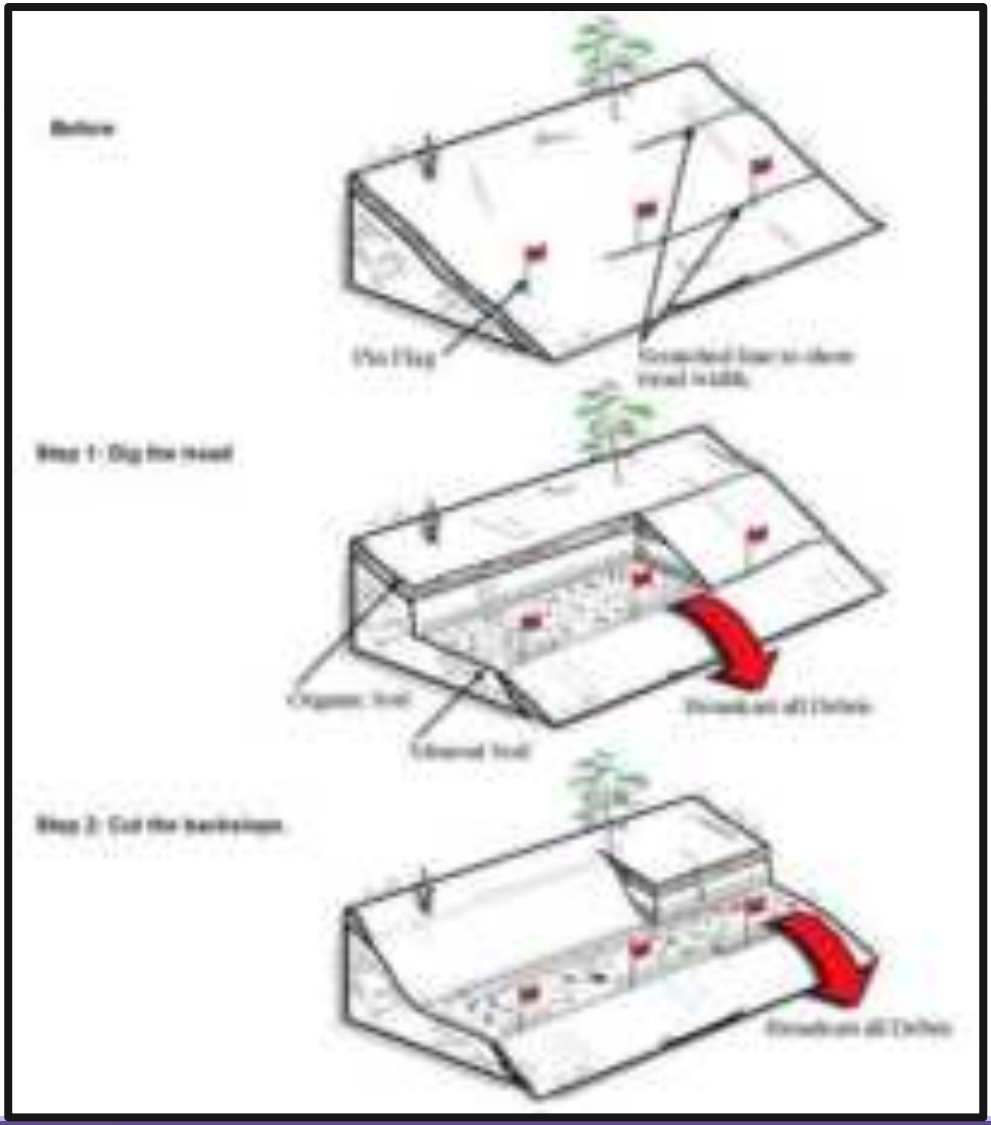
(4) Finish

(5) Maintain

Rough Cutting & Finishing Overview



Rough Cutting & Finishing Overview (cont.)

Basic Trail Concepts

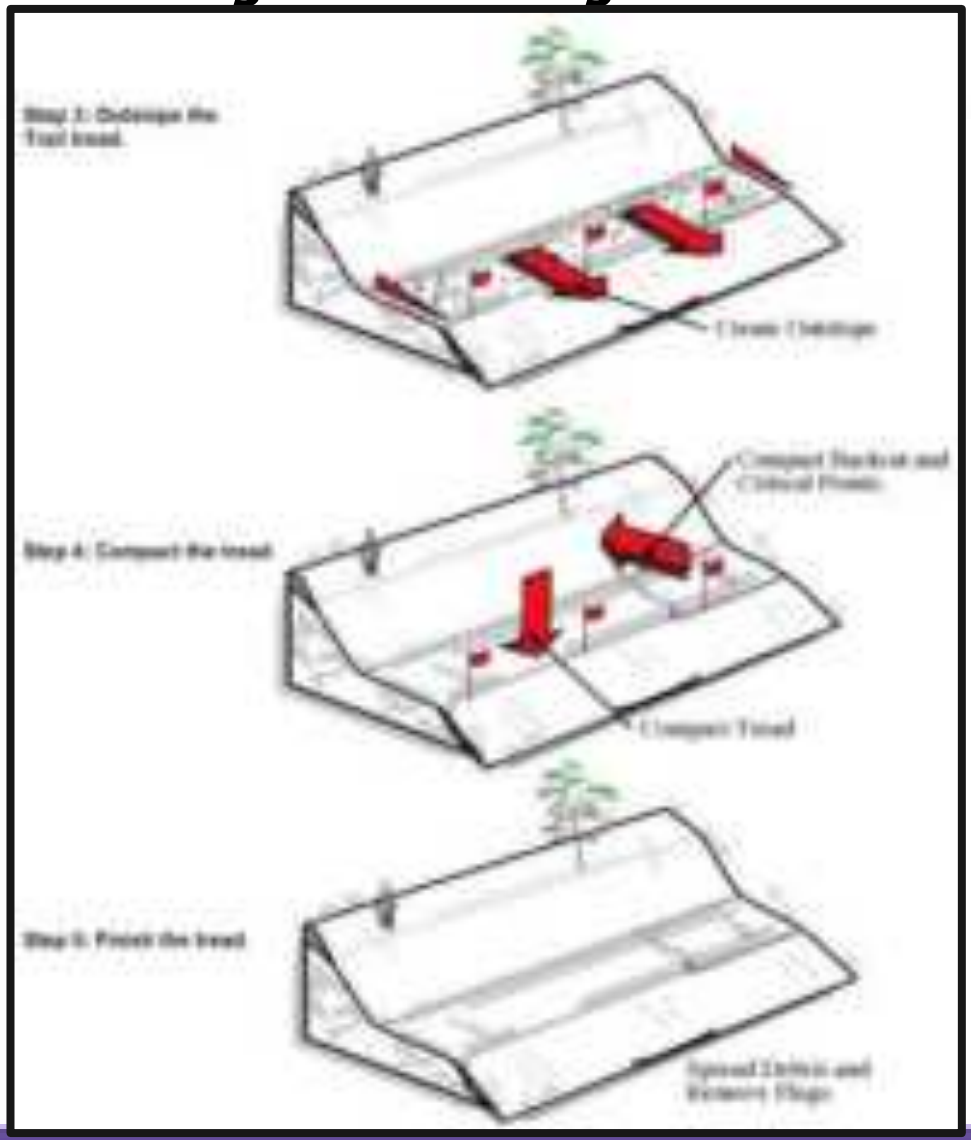
(1) Survey

(2) Pioneer

(3) Rough Cut

(4) Finish

(5) Maintain



Basic Trail Concepts

(1) Survey

(2) Pioneer

(3) Rough Cut

(4) Finish

(5) Maintain

Rough Cutting & Finishing Overview (cont.)

Pro-Tip: Create a rotating assembly line. The fastest way to cut a trail is for the Crew to be divided into pioneers, rough cutters, and finishers. Once the pioneers have cleared sufficiently in advance, add them to the rough cutters. The rough cutters in the front have the hardest work, followed by rough cutters in the middle, followed by finishers. Rotate workers down the line based on their own fatigue. The entire Crew moves up the trail together like a food processor turning raw land into lean ground trail.

References

OA Foremen

Building Better Trails; IMBA (2001)

Sustainable Trail Development, A Guide to Designing and Constructing Native-surface Trails; IMBA (2009)

Trail Construction and Maintenance Notebook; USFS (https://www.fs.fed.us/t-d/pubs/htmlpubs/htm07232806/toc.htm)

Takeaway Challenge

The next trail you hike, identify the trail design specifications implemented for that trail's uses.

NOAC 2024

UC Boulder

SEEK NEW HEIGHTS

Trail Building

Soils and Materials

Bradley J. Ellis, Esq. • **bradjellis@gmail.com**
Joshua Hipps • **joshua.hipps@gmail.com**

Choosing Materials

- Trail structures should be built of quality, long-lasting material and designed to harmonize with the surrounding environment.
- When native materials are used, materials should be sourced out of visibility from the trail, and the source site should be left in as natural a state as possible.
- Minor structures (e.g. puncheon, turnpike, minor retaining walls, check dams or steps, and small bridges) can be built of suitable native wood material, if it is available.
  - Certain species of wood are more durable than others, and structure lifespan will depend on the environment.
    - Lifespan of wood features may vary greatly from 3-20 years.
  - <u>Wood must be fully debarked to prevent or mitigate rot</u>.

Choosing Materials (cont.)

- Rock makes a longer lasting structure than wood, and should be especially desired for large retaining walls, culverts, water bars, and bridge sills.
  - Rock structures often better blend in with the natural environment, both in the short-term and long-term.
  - A well-built rock feature will last 100+ years.
- The most durable material should be used, and time taken to work with it will pay off in the long run.
- Some land managers may also choose to use Geosynthetics in trail construction.
  - Depends on whether their use is desired, permitted, authorized, and whether the budget allows.

Choosing Materials (cont.)

- Geosynthetics are synthetic materials (usually made from hydrocarbons).
- Geosynthetics can be more effective in some situations.
- Geosynthetics perform three major functions: separation, reinforcement, and drainage.
- Geosynthetic materials include geotextiles (construction fabrics), geonets, sheet drains, and geocells.
  - These materials become a permanent part of the trail and should be covered with soil or rock.
  - If the material is exposed, it can be damaged by trail users and may cause users to slip or trip.

Choosing Materials (cont.)

- Ex: Geosynthetic used as Check Dam in rainforest conditions.
  - Manoa Falls Trail; Oahu, Hawaii

Materials: Universal Rock Size Lexicon (not to scale)

- “Gravel” = average of but no bigger than
- ”Golf balls” =
- “Baseballs” = and “Softballs” =

Materials: Universal Rock Size Lexicon (not to scale)

- ”Footballs” = average of but no bigger than
- “1-Hernia” = Largest rock you can carry yourself without getting a hernia (typically 2 to 3 footballs in size, depending on density of the rock).
  - Only acceptable for single-person carry over very short distances.
- “2-Hernia” = Typically 4-5 footballs in size (dependent on if anyone is watching).
- “BFR” = “Big Friggin’ Rock” = Bring me the biggest rocks you can find.

Transport of Materials

- Soil = Bucket
- “Gravel” = Bucket
- “Golf balls” = Bucket
- “Baseballs” = Bucket
- “Softballs” = Bucket
- “Footballs” = Bucket, or single-person hand carry.
- “1-Hernia” = No-bucket; single-person hand carry over short distances; multi-person rock-sling over long distances.
- “2-Hernia” = Rock-sling.

- “BFR” = Rock-sling if it fits; rail-slides if too big for rock-sling.

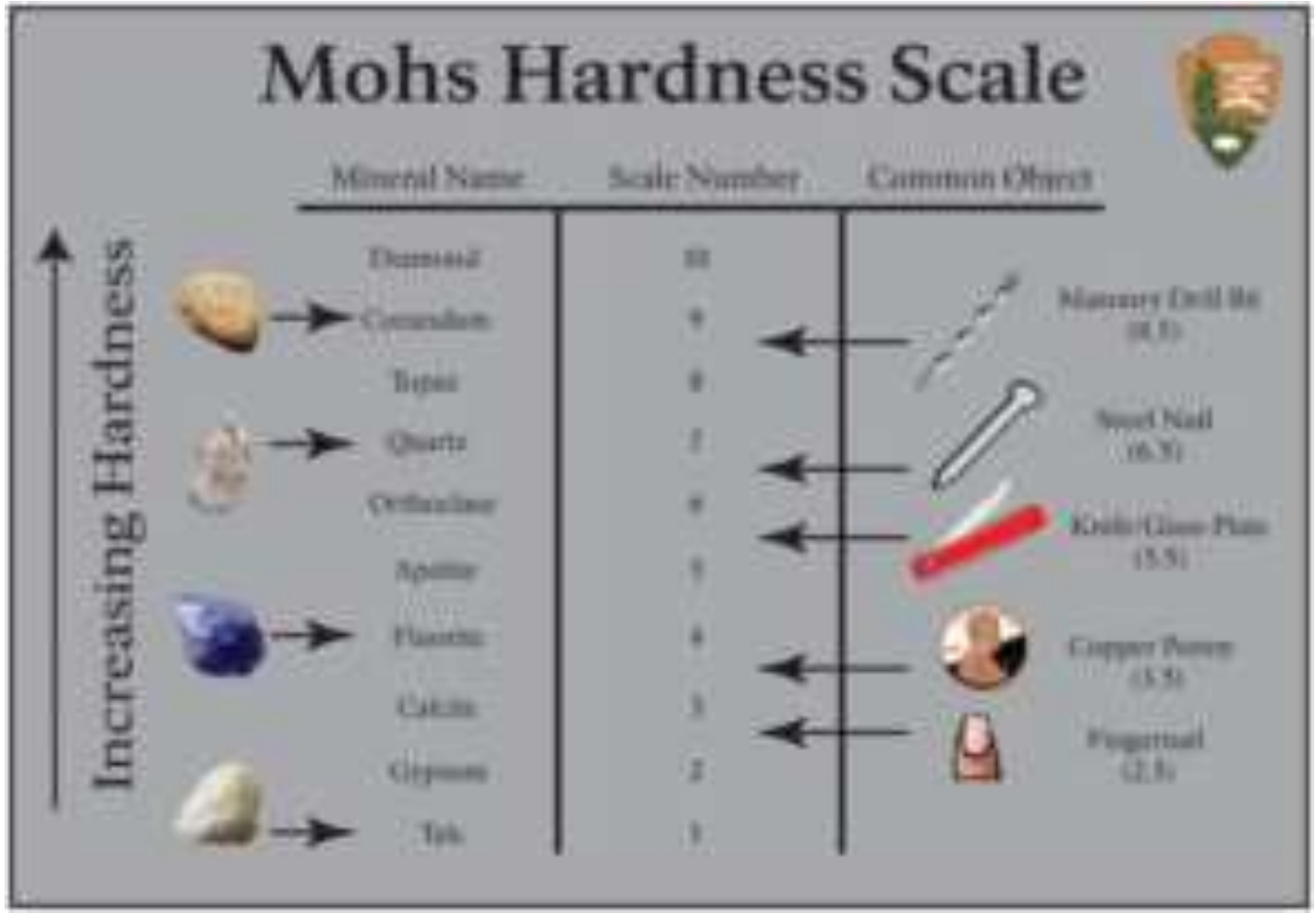
- Pro-Tip: Except for short distances or where necessary bucket circulation exceeds duffle-bag supply, buckets are best used placed in the duffle bag, then filled up to the bucket line, then transported using the backpack straps.
- Pro-Tip: Do no roll rocks. It will damage the trail and/or natural surrounding areas, and is often harder and more dangerous than proper carrying techniques.

Tips on Materials Sourcing

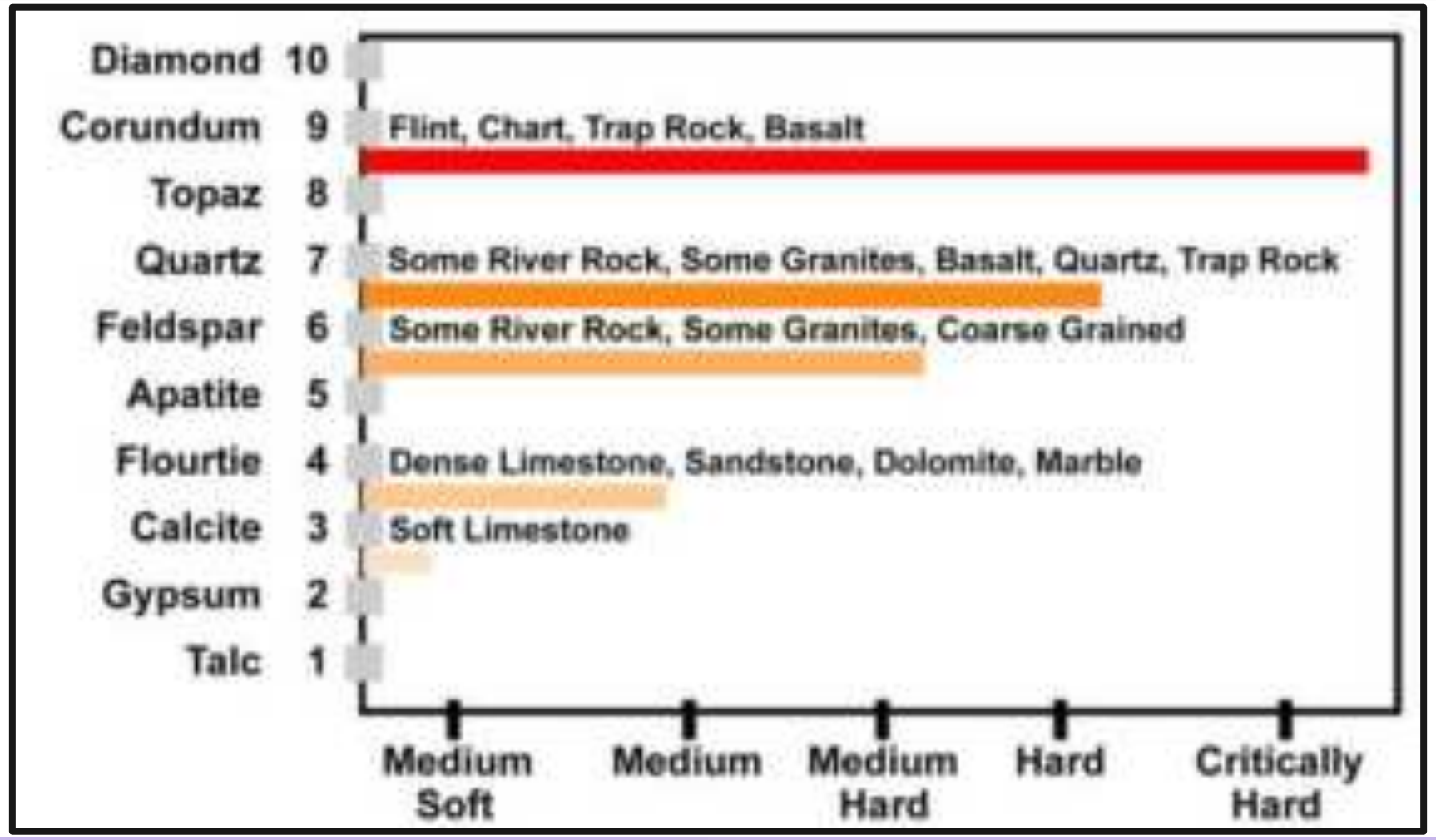
- If your project requires locating and sourcing natural materials at the project site, then some needs to be tasked with searching for necessary resources immediately.
  - If you wait to look for materials until they are needed, you are too late, and your project will be delayed.
- Dirt sources are often termed “borrow pits.”
  - Underneath uprooted tree wads are often a great borrow pit source.
- Bountiful rock sources are often termed “quarries.”
  - Rock sources are the hardest to locate.
  - Generally look for areas with multiple loose football or 1-hernia sized rocks exposed.
    - Such locations often indicate layers of generally loose rock that can be excavated.
  - Carry a rock-bar on your quest to use for probing and prodding.
- Borrow pits and quarries should be located off the trail and completely outside of view from the trail.
  - Side-trails to these locations should be completely naturalized after use.

Tips on Materials Sourcing (cont.)

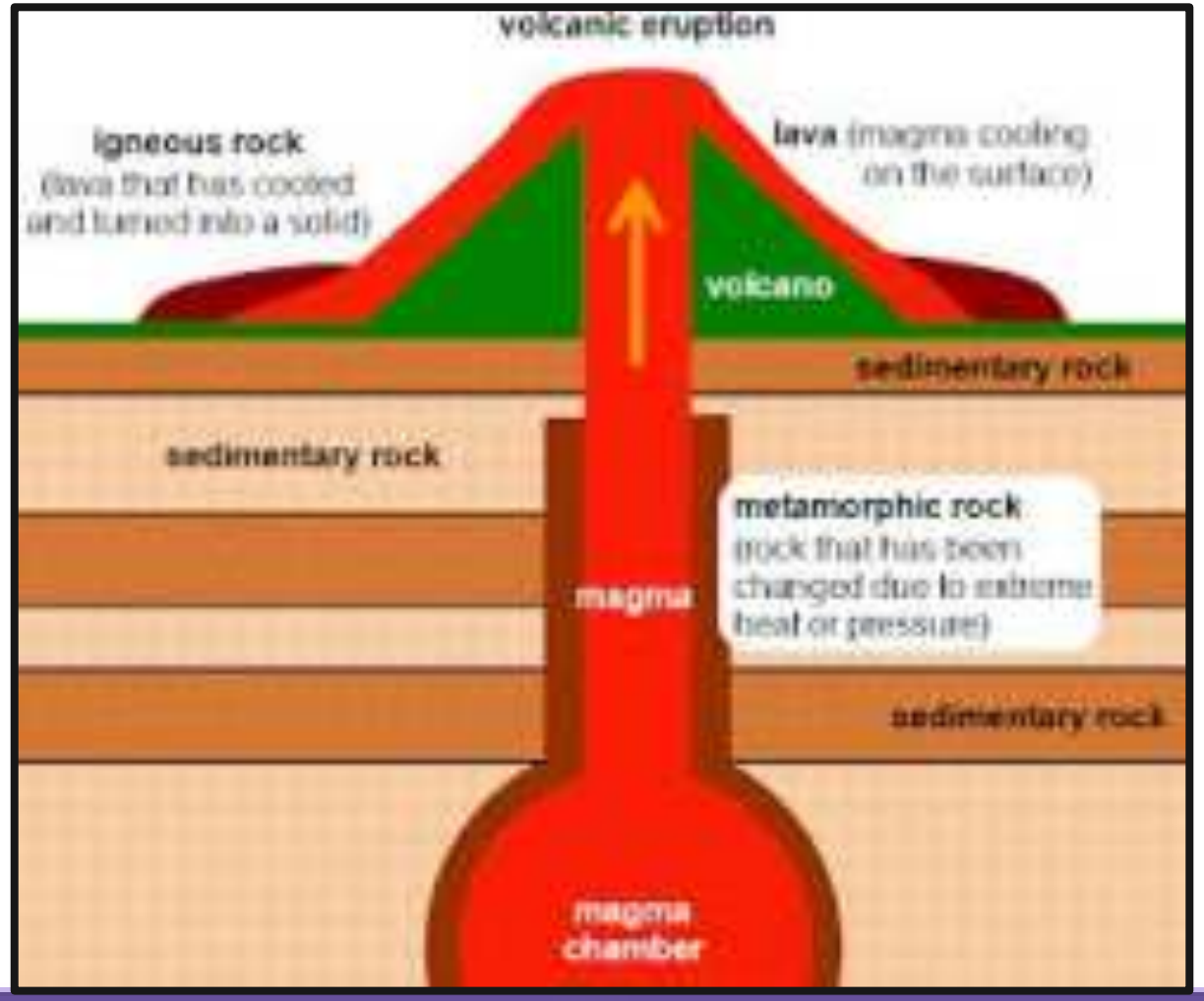
- Not all rocks are created equal[ly hard].
  - Avoid using wasting time and energy hammering hard rocks that refuse to break.
  - Make a modest effort to break a rock, but if it won't give, set that rock aside for use as a larger sized rock, and move on to breaking another rock.
  - Mohs = Ordinal Scale (no standard measurement of differences between categories).
    - For example, corundum (9) is twice as hard as topaz (8), but diamond (10) is four times as hard as corundum.



Tips on Materials Sourcing (cont.)



Tips on Materials Sourcing (cont.)



Tips on Materials Sourcing (cont.)

- Shale and Slate break easiest.
  - Slate is a metamorphic rock derived from an original shale-type sedimentary rock.
- Higher metamorphism results from higher temperatures and higher pressures = harder to break.
- Avoid wasting time on rocks that look like they are gneiss.
  - And definitely never waste time making gravel out of gneiss.

Tips on Materials Sourcing (cont.)

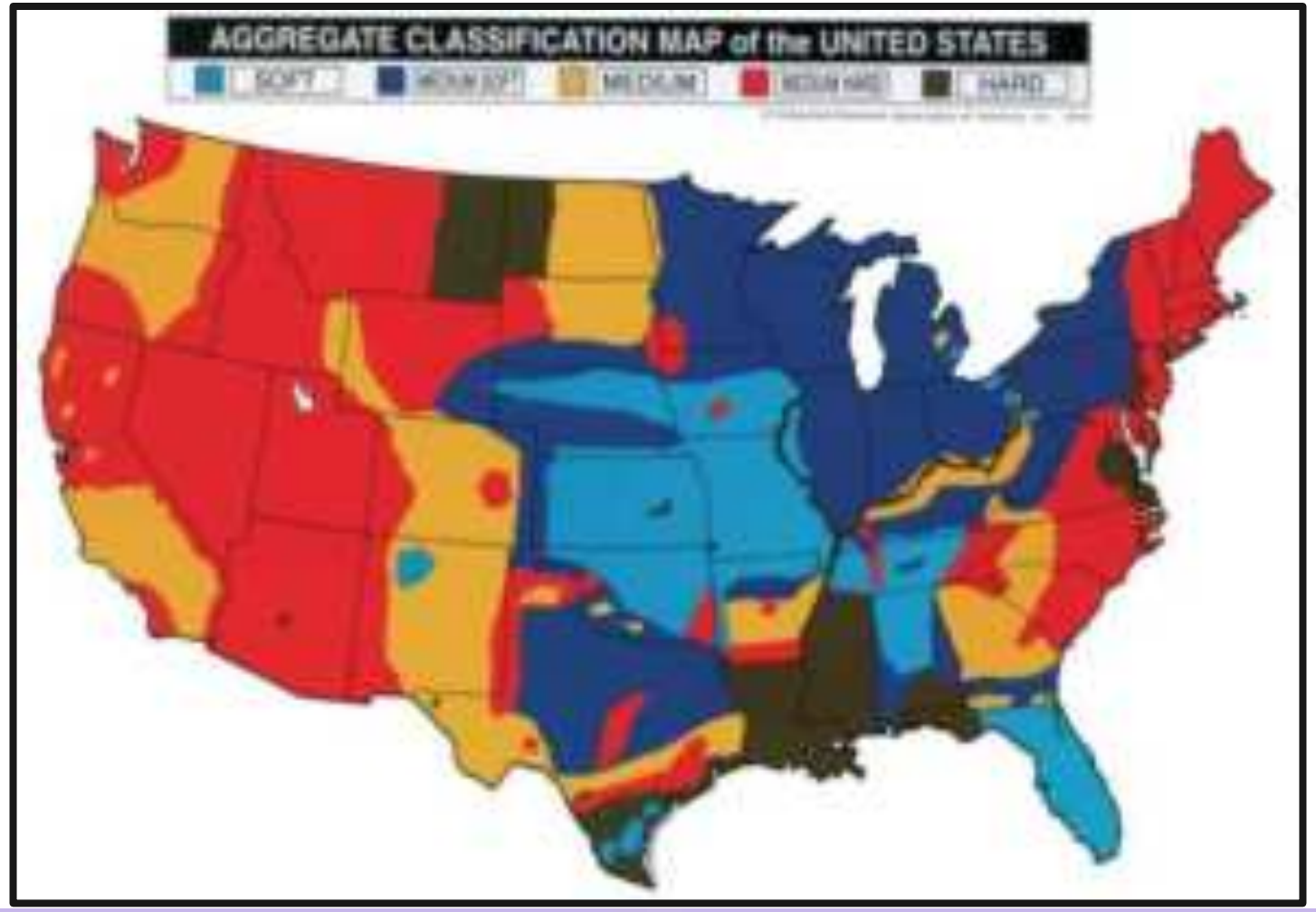
- In materials science and engineering, the Pascal measures the stiffness, tensile strength and compressive strength of materials.
- MPa = MegaPascal
- 1 MPa = 145 pounds per square inch of force.
- Igneous, metamorphic, and sedimentary rocks can be classified from very weak to very strong with regards to their unconfined fracture strengths.
- Generally:
  - Sedimentary rocks can range from weak to medium (10-80 MPa).
  - Igneous rocks range from medium to very strong (40-320 MPa).
- The highest unconfined compressive strength observed in a rock is on the order of 400 MPa (e.g. nephritic jade).

Tips on Materials Sourcing (cont.)

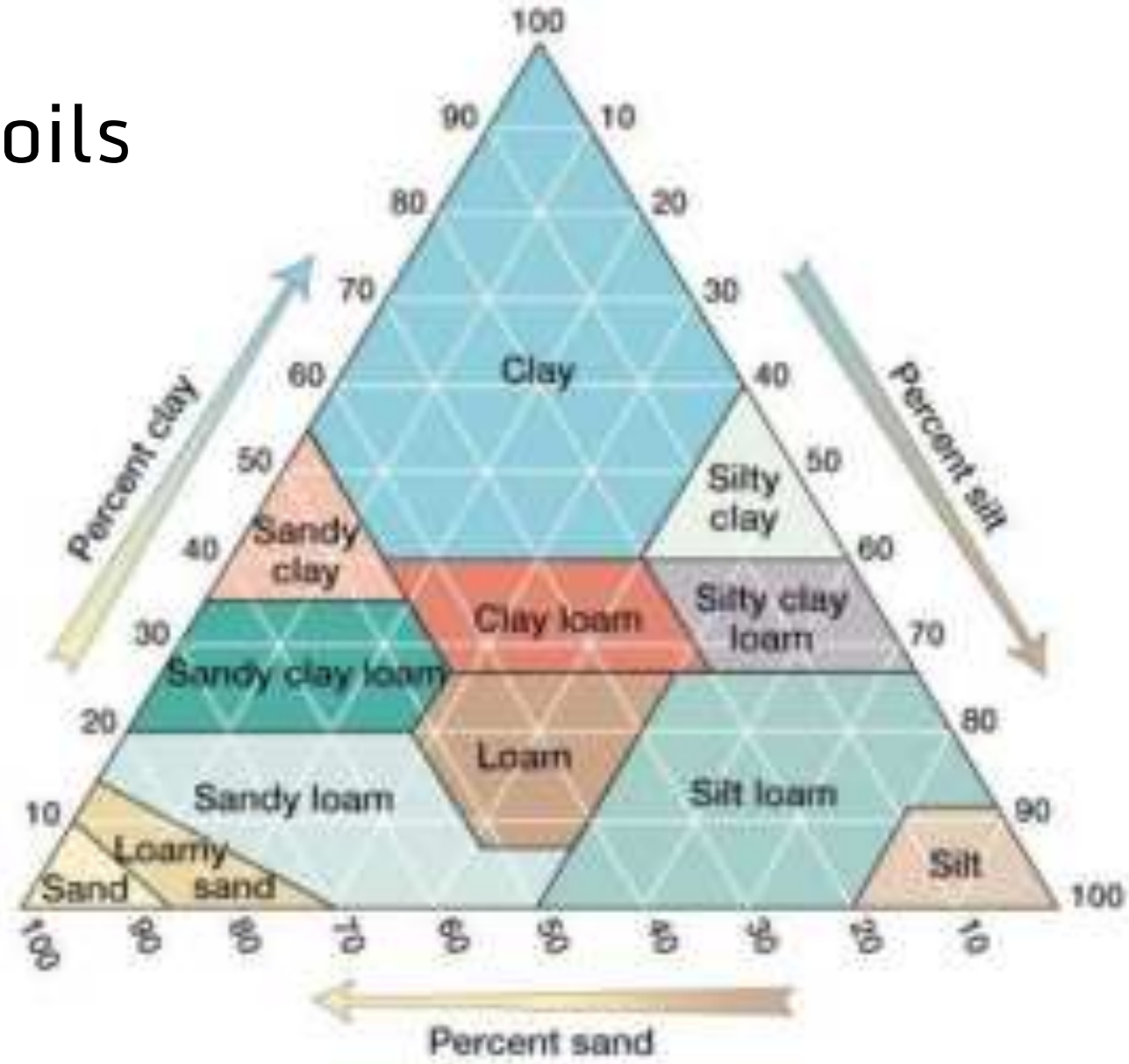
Strength classification	Strength range (MPa)	Typical rock types
Very weak	10-20	weathered and weakly-compacted sedimentary rocks
Weak	20-40	weakly-cemented sedimentary rocks, schists
Medium	40-80	competent sedimentary rocks; some low-density coarse-grained igneous rocks
Strong	80-160	competent igneous rocks; some metamorphic rocks and fine-grained sandstones
Very strong	160-320	quartzites; dense fine-grained igneous rocks

Table 1. Classification of rock hardnesses (from Attewell & Farmer 1976).

Tips on Materials Sourcing (cont.)



Classification of Soils



Relative Grain Size

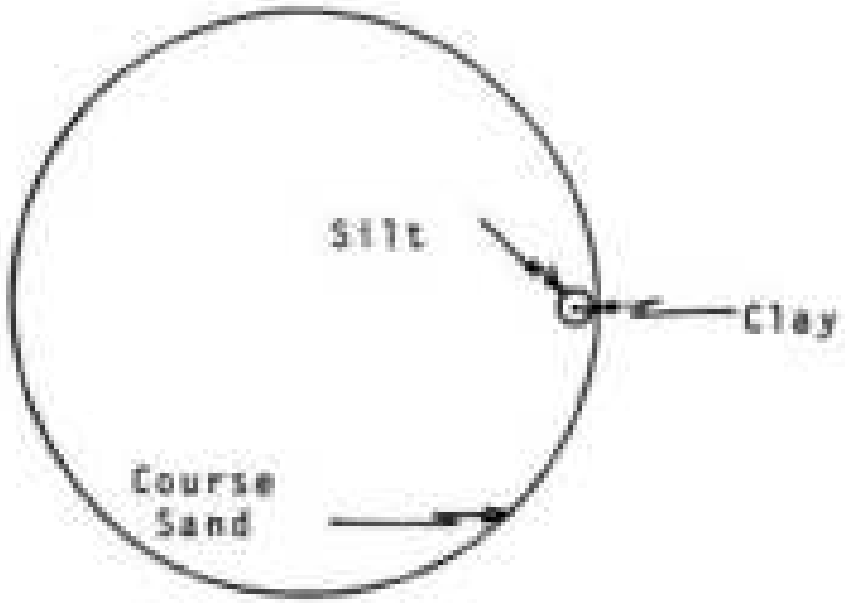
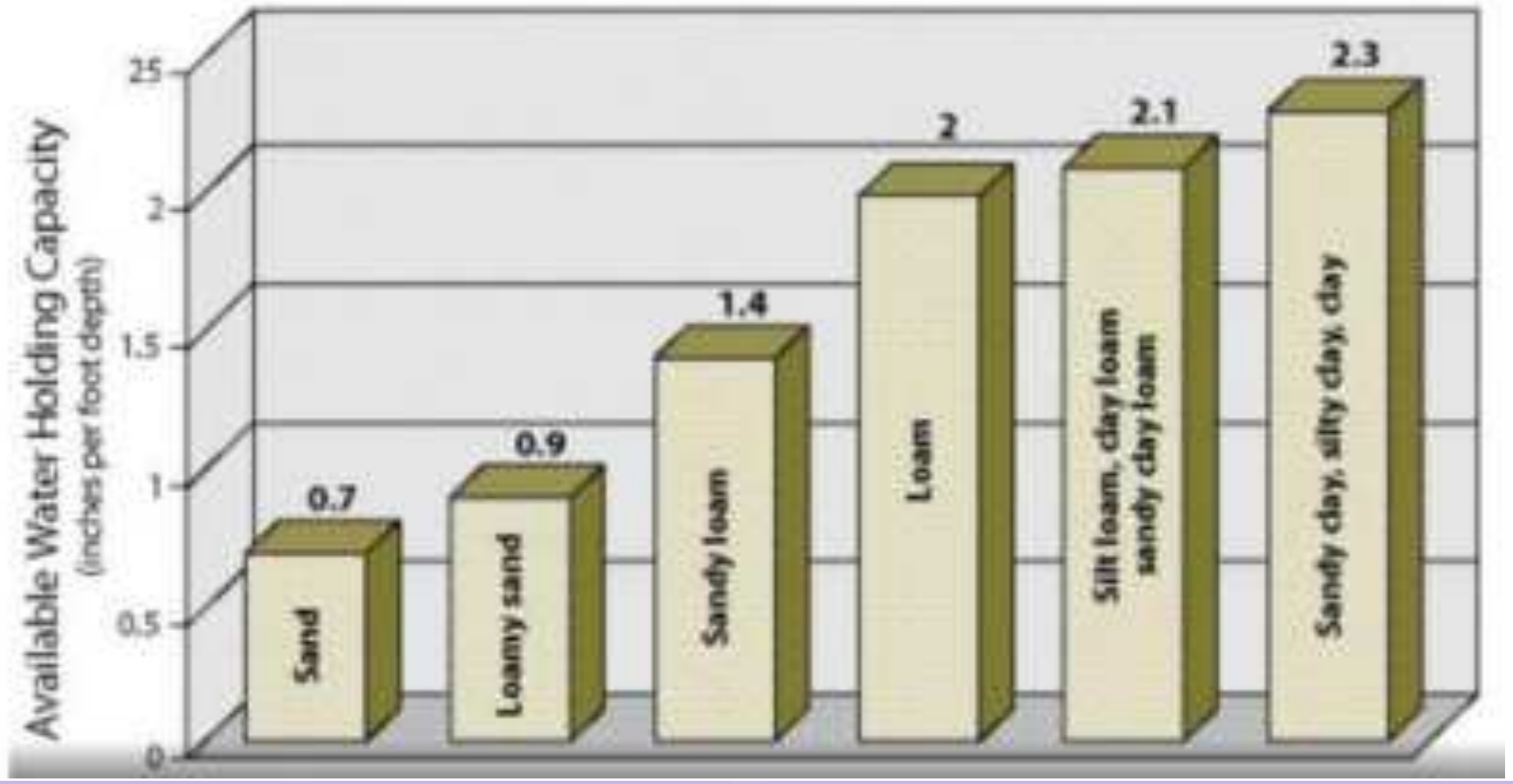


Figure 1. Relative sizes of sand, silt, and clay separates in the USDA Textural Classification System. Even though the three kinds of soil particles have been enlarged about 60 times, the clay clay particle can barely be seen.

Know your Soil

- Soil type and texture have a major influence on soil drainage and durability.
- Texture refers to the size of individual soil particles.
  - Clay and silt are the soil components with the smallest particles.
    - Small particles tend to be muddy when wet and dusty when dry.
    - Clay and silt don't provide good drainage.
  - Sand is made of large particles that don't bind together at all and are very unstable.
- **The best soil type is a mixture of clay, silt, and sand**.
  - If your soil is lacking any one of these, you can attempt to add what's missing
  - Knowing the soil types that you will encounter when building trails will help you develop a solid, stable tread.
- A lot of information on soils can be found at the USDA Natural Resources Conservation Service (http://soils.usda.gov)

Soil Water Holding Capacity



Field Testing Your Soil For Type

Get To Know Your Soil With the Ribbon Test

Roll a handful of moist soil into a tube shape with both hands. Squeeze it between your thumb and forefinger to form the longest and thinnest ribbon possible.

Texture	Feel	Ribbon
Sand	Grainy	Can't form a ribbon
Loam	Soft with some graininess	Thick and very short
Silt	Floury	Makes flakes rather than a ribbon
Sandy Clay	Substantial graininess	Thin, fairly long—50 to 76 mm (2 to 3 inches)—holds its own weight
Clay	Smooth	Very thin and very long—76 mm (3 inches)

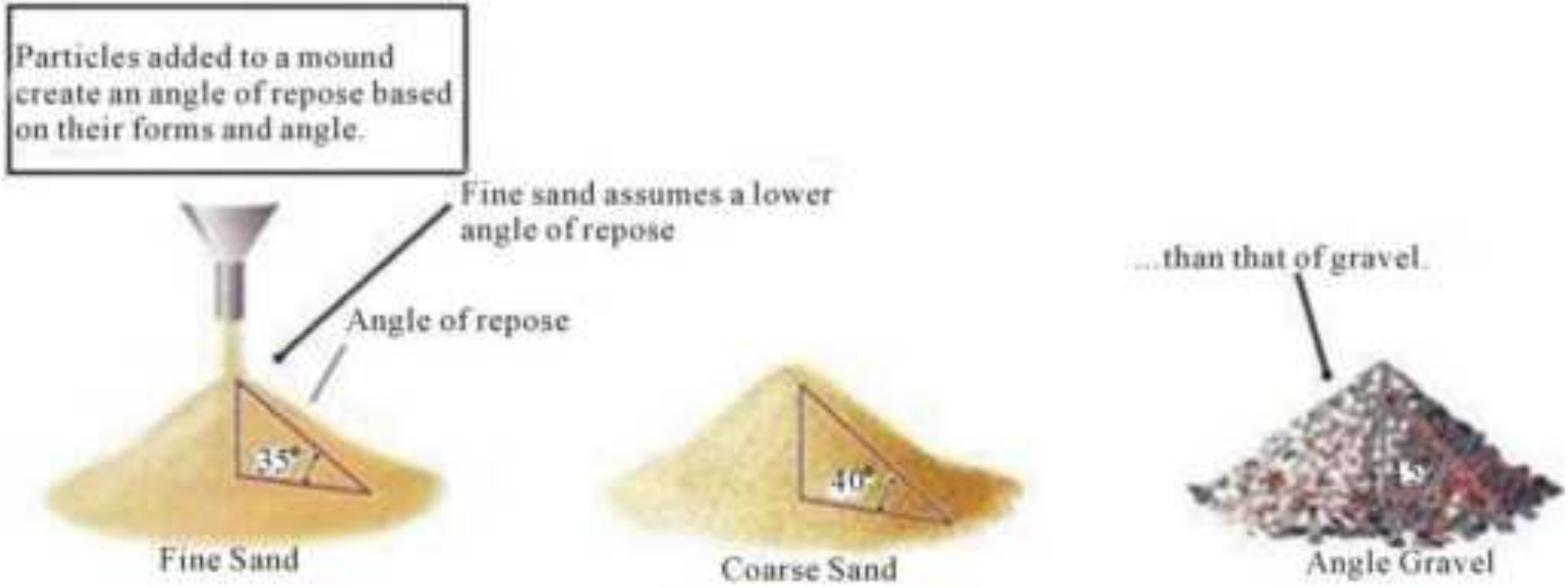
Field Testing Your Soil for Compaction

- The act of compacting soil that is “too wet” will typically move soil to the sides of compaction impact because its too slippery and plastic
- All the pore spaces are filled with water, and possibly even ‘floating,’ so compaction isn’t going to reduce pore spaces as effectively as ‘moist’ soil where it will stay put and pack down thanks to adhesive forces between water and soil.
- Water has a lubricating effect that helps particles slide into tighter positioning.
- If too dry the soil loses adhesive properties and is not as “plastic” or slick so it won’t pack down as well, if at all.
- The **Proctor compaction test** is a laboratory method of experimentally determining the optimal moisture content at which a given soil type will become most dense and achieve its maximum dry density.

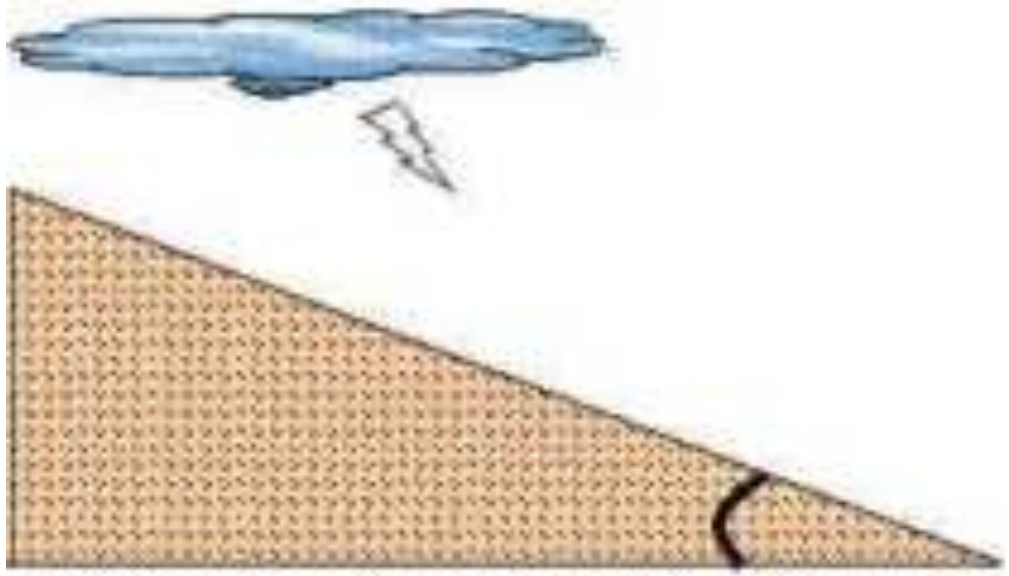
Field Testing Your Soil for Compaction (cont.)

- Quick-Dirty “Proctor” Field Test:
  - Squeeze a ball of soil in your hand, and then give it a light (few inches) toss and catch.
    - If it’s powdery and won’t hold a shape, then it’s too dry.
    - If it molds into a ball then breaks into a couple of pieces when tossed and caught, then it’s about right.
    - If it leaves moisture on your hand and doesn’t break when dropped, then it’s too wet.

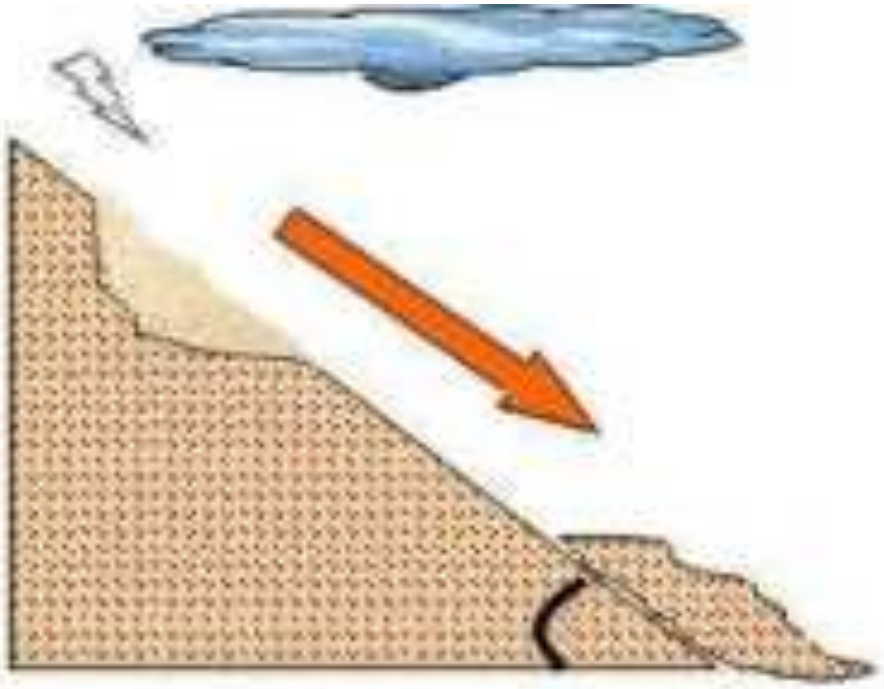
Angle of Repose



Angle of Repose / Limits

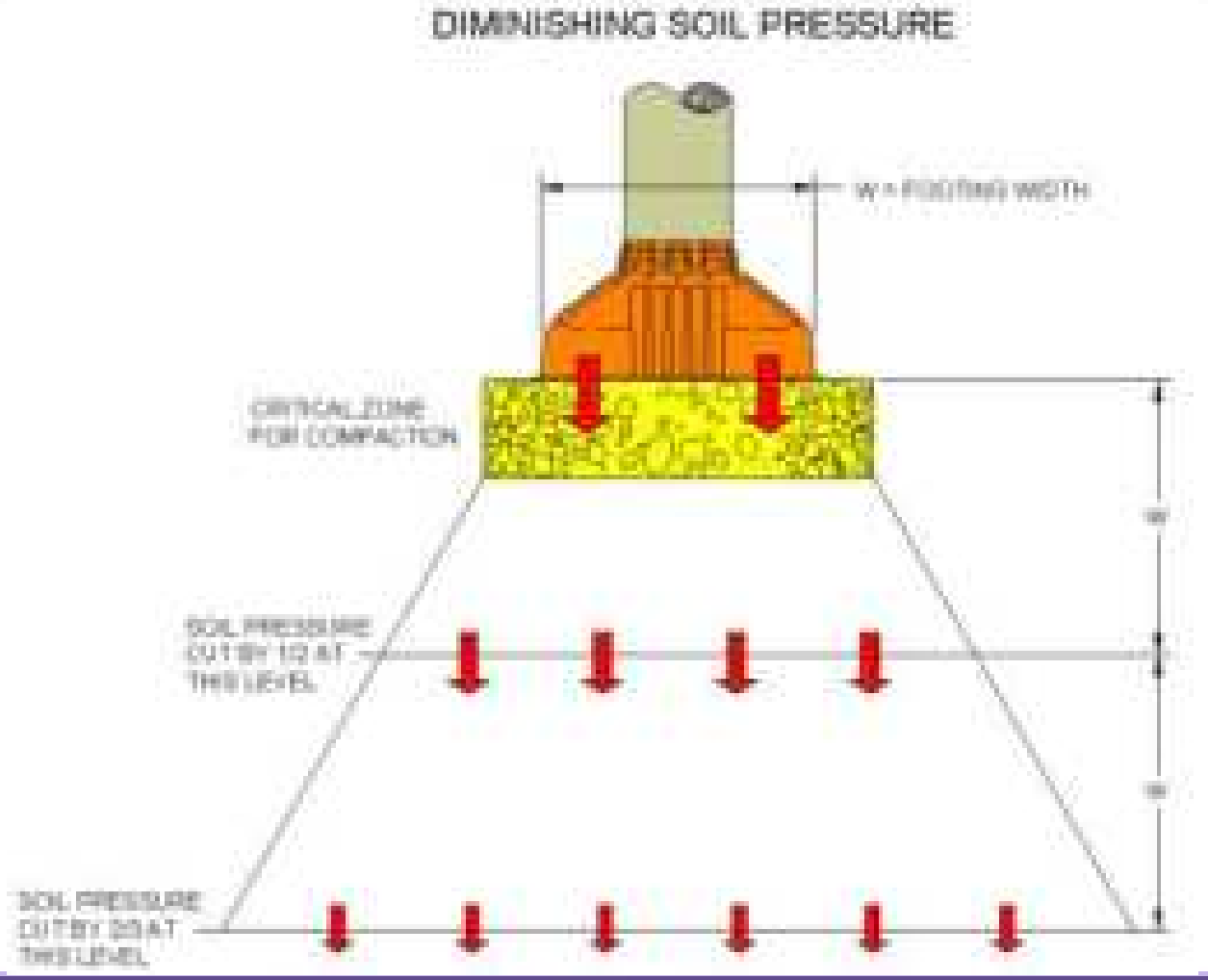


Slope angle less than the *angle of repose*: *slope remains stable*



Slope angle greater than the *angle of repose*: *mass wasting will occur*

Diminishing Soil Pressure Cone



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OA Foremen

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Aggregate Hardness Map of the US; ForConstructionPros.com; https://www.forconstructionpros.com/equipment/worksite/article/10745911/aggregate-hardness-map-of-the-united-states

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Takeaway Challenge

Identify the types of rocks readily available in your local for trail construction projects.