



GEL 2530 - Introduction to Geologic Field Work

FIELD DAY 3 (200 pts)

LOCATION:	City of Longmont Sandstone Ranch Community Park 2525 E Ken Pratt Blvd, Longmont, CO 80504	GPS: 40.15425817873174, -105.03726935758897
TIME:	Start 9:30 AM: Meet at Upper Parking Lot indicated by the GPS coordinates (Leave "home" at appropriate time to arrive BEFORE start time)	

GENERAL INFO

- This is a City OPEN SPACE. - **NO ROCK COLLECTING ALLOWED** -
- No congregating of large groups in one location on the trail. Please disperse and break up into smaller groups for field work.
- STAY ON TRAIL
- Bring a Sack Lunch
- Bring ALL your Course Equipment including writing utensils
- Bring any personal item you deem necessary for the day (e.g. sunscreen, hat, jacket, etc.)
- Total day hike distance about 1 mile round trip dispersed with measuring activities
- "Facilities" are available at upper parking lot and the 700 ft distant park shelter.

FIELD OBJECTIVES:	<ol style="list-style-type: none"> 1. Creating a topographic base map 2. Creating a geologic outcrop map overlay 3. Notebook descriptions of rocks present 4. Cliff height estimation
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GRADING:	<p>- All exercises to be answered / documented in Field Notebook -</p> <p>Field Notebook Due on CANVAS by 8:00 PM</p> <p><i>Use your cell phone (PDF creator app?) to make quality copies of today's notebook entries & exercises for upload</i></p> <p>You will lose 10% per hour late with a minimum of 10% score after that</p> <p>You may work in groups of up to 3 people. However, each individual must turn in their individual notebook with ALL notes and data by the end of the day</p>
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General Grading Rubric:

Generally my grading is pretty much straight forward. I will deduct points from each exercise below for errors, falsehoods, idiosyncrasies, omissions, non-legibilities, computation discrepancies, missing data, calculation mistakes, etc. etc. Percentages of total points may be deducted for repeated errors or larger omissions. This includes missing (forgotten) essential field equipment.

Field Notebook Entries	Rock descriptions with miniature stratigraphic column	50 points
Topographic base map with contour lines and scale - see below -		50 points
Geologic Outcrop map Overlay, sketched or penciled OVER topographic map - see below		50 points
Cliff Height Estimation - see below		50 points

Field Reconnaissance Exercises

Topographic Base Map

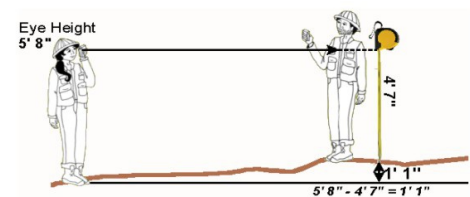
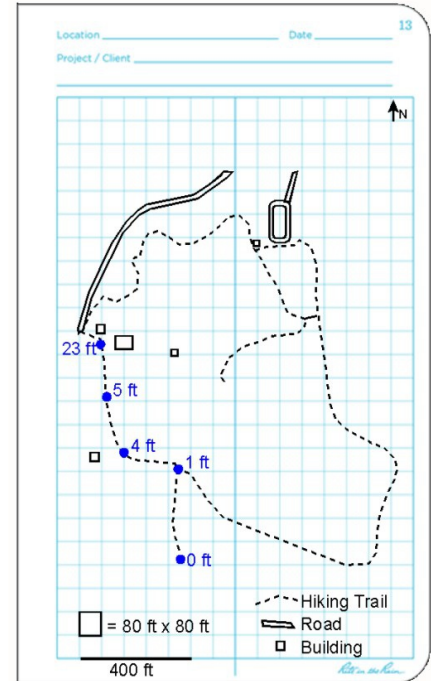
Topographic maps create the base for geologic assessments. Often, these topomaps are not available for small scale areas. In this exercise you create your own.

Method

Field Work Handbook, p.15 - 17, Reading and Plotting Compass Bearings PLUS Field Work Handbook, p.27, Height of Sloping Hills

Creating a topographic map from St. Vrain River floodplains to upper parking lot at Sandstone Ranch Park

- This exercise is almost identical to the DAY 2 “Mapped Path(s)” exercise except you will add elevations to your survey path as partially indicated.
- To make this exercise a little easier, the ACTUAL trail is shown in the example. Your map should cover a similar area in your field notebook once completed.
- While you should indicate your elevation data points, make them faint and small. Otherwise your finished map with contour lines added will look too cluttered.
- It is usually easiest to START from the lowest elevation point and measure upward. The lowest point can be labeled 0 ft if the sea level elevation is unknown, as shown.
- While greater elevation gains can be done with eye height straight site survey, as shown on p.27 in your Field Work Handbook, gentler elevation gains are best done with a partner, as illustrated. *Example: A student with an eye height of 5' 8" shoots a level elevation toward her partner who stands a elevated in the distance. A straight line of sight “hits” him in his vest pocket which is measured to be 4' 7" above ground. The difference 5' 8" minus 4' 7" equals an elevation change of 1' 1" between the two students.*
- You may round elevations to the nearest full foot.
- Populate your path map with as many elevation points as you can.
- Draw contour lines using your elevation points. Do not forget to show / label index contours and indicate the contour interval. If you are “rusty” on contour lines and how to draw them, please watch my YouTube tutorial: <https://youtu.be/HwxhUI4Uusg>
- Remember, steep slopes, like cliffs have closely spaced contour lines while gentle slopes have wide spaced contours.
- Don't forget North arrow, map scale, contour interval, map legend.**



Geologic Outcrop Overlay Map

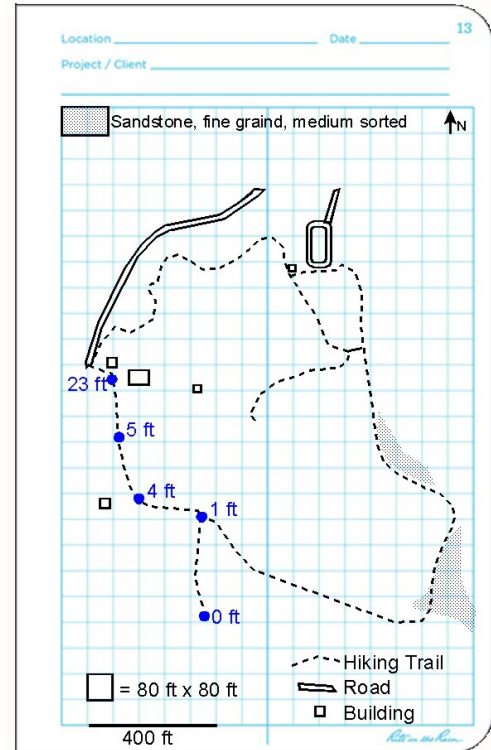
A Outcrop Overlay map is different than a fully developed geology map. You basically just sketch in the exposed rock types on your map and leave grass, paths, soil cover, etc. blank

Method

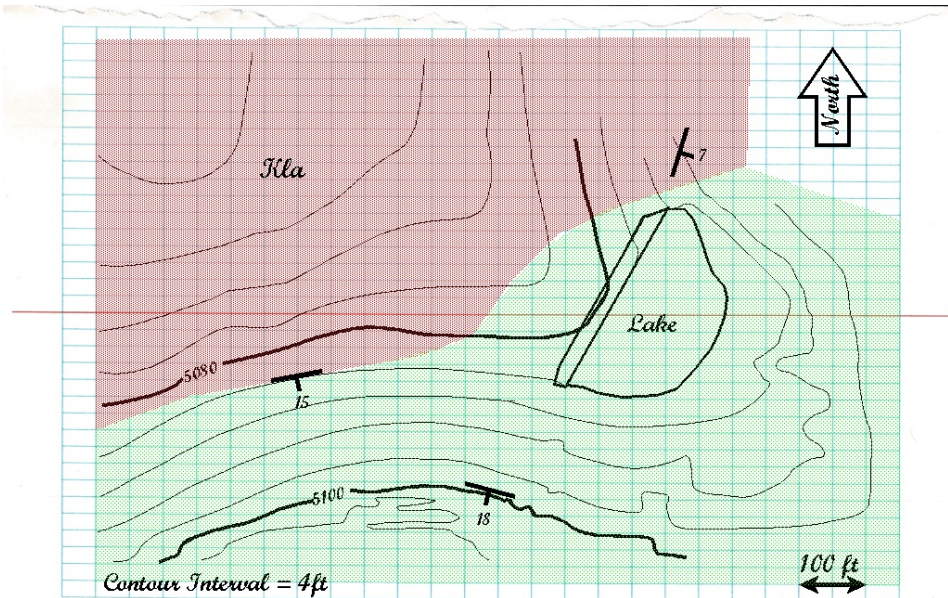
NOT in Field Work Handbook (!)

Interpretative Geologic Outcrop Overlay over base map


- Draw in the extended of the geologic outcrop and hand-shade or color over your base contour map. In the pictured example, the contoured topomap is NOT shown.
- Place any measured data points, such as Strike and Dip symbols in the correct orientation on your map as well.
- While only one rock type is shown in the example (sandstone), be aware that there may be different rocktypes, including different sandstones at the location. You should have a legend showing the shading / stipple pattern for each rocktype as indicated on the example map.
- In your Legend, the oldest rocktype should be on the bottom, the youngest on top!




Example of an Interpretative Geologic Outcrop Overlay over a contour lined base map (Note: The pictured geologic map is an example and **NOT** representative of the Sandstone Ranch Geology)



Cliff Height Estimation	<p>The City of Longmont Sandstone Ranch Park has a prominent sandstone cliff right at its center. This should show up nicely in your topographic maps. You can see a delineation between two rock units, almost like a straight horizontal line, separating the lower 1/4 of the cliff from the upper 3/4 of a prominent, resilient cliff. Unfortunately, direct measurement of the cliff height and thickness of these two units is NOT possible.</p>
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Method	
<p><u>Estimate the Cliff Height and the thickness of the two distinct rock units from a distance</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> You may use ANY of the height estimation methods practiced during field methods DAY 1 you think would work. You need to only pick one method! <input type="checkbox"/> Obviously you can NOT pace directly to the cliff wall for distance. However, if this distance is needed for your height estimation, you may try <u>Method II: True Distance by Double Triangulation</u> on page 23 in your Field Work Handbook without leaving the hiking trail. <input type="checkbox"/> Use your problem solving ingenuity. Maybe the best answer is not in the book. Maybe a mathematical solution by using an angle measurement and pace distance at the edge of the cliff where a trail is present might work best. <input type="checkbox"/> Maybe another way of estimating distance “d” to cliff is by shooting a azimuth parallel to the cliff face while standing on the trail and another azimuth with the same compass bearing at a distance from the cliff and pacing the distance between the two azimuth readings on a trail parallel to the cliff face. <input type="checkbox"/> Part of your grade will be your problem solving ingenuity you set forth in your cliff height estimation without breaking park rules and regulations of leaving the trails. <input type="checkbox"/> Be sure to document your method in your field notes. 	

<p>Rock Descriptions with miniature stratigraphic column</p>	<p>There are several beautifully exposed rock outcrops at the Sandstone Ranch Community Park right on or next to the trail. The easiest way to describe them in detail is by constructing a stratigraphic column with rock description details right next to it. The oldest unit should be on the bottom, the youngest on top.</p>
<p>As with the previous DAY 2 assignment, address the listed details in your field notes next to the stratigraphic column.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Assumed rock type / age (any RockD data marked as such) <input type="checkbox"/> Weathering patterns (Cliff former? Dissolution cavities? Etc.) <input type="checkbox"/> Color (fresh & weathered) <input type="checkbox"/> Assessment of cement and / or any observable mineralogy <input type="checkbox"/> Grain size (numeric if at all possible) <input type="checkbox"/> Roundness / Sorting observation for sedimentary rocks <input type="checkbox"/> Porosity (Does your acid drop soak in?) Size of drop soak analogous to porosity <input type="checkbox"/> Fossils, Trace fossils, and other features (e.g. ripple marks, cross bedding, bioturbation?) Be detailed, give sizes and density of occurrence
<p>Stratigraphic Column Example</p>	<p>Detailed description and graphical representation of rocktypes and weathering patterns are beautifully illustrated in a stratigraphic column <i>(Note: The pictured stratigraphic column is an example and NOT representative of the Sandstone Ranch Geology):</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> The column needs to have a vertical thickness scale <input type="checkbox"/> Rock layer thickness to be measured and drawn to scale in the column <input type="checkbox"/> The column should show weathering characteristics (e.g. soft vs hard) <input type="checkbox"/> The lithology should be stylized or shaded to represent the rocktype <input type="checkbox"/> A detailed description can be placed right next to the column <div data-bbox="956 680 1466 1476" style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p style="text-align: right;">13</p> <p>Location _____ Date _____</p> <p>Project / Client _____</p>  <p style="margin-left: 20px;">50 Feet 10 0</p> <div style="margin-left: 20px;"> <p>Silica Ss Ss, fine-grnd, micac., predominantly Si cemented, platy, gray green.</p> <p>Platy Ss Ss, fine grnd, 1" to 8" bedding, reddish brown interlayer w/ red brown, silty, fissile clayst. Some dolomite nodules in upper part.</p> <p>Clayst. Sh, silty, micac., red brown to purple. Some carb. nodules.</p> </div> <p style="text-align: right; font-size: small;"><i>lit. in sketch</i></p> </div>