

TOPOGRAPHIC MAPS

Introduction

Topographic maps are used in many instances to find suitable building sites, to plan public works, or to find the best route for hiking in the wilderness. Topographic maps are also used for natural resource conservation and restoration efforts and management. A topographic map is a flat representation of the elevation and contours of an area. Maps are drawn to scale, and include both natural and man made features. They show and name major natural features and include representations of prominent man made landmarks such as roadways and buildings.

Major features

The most notable feature of the topographic map are contour lines. Contour lines are imaginary lines that join points of equal elevation. At every fourth or fifth contour line, the line is printed heavier, and labeled with the elevation. These reference lines are called index contours and help to indicate the direction of the slope as well the elevation. At certain points on a topographic map, individual elevation points apart from the contour lines are measured. These more precise measures are called bench marks. On the ground these points are marked by a brass plaque. On the map they are marked by an X with the elevation labeled beside it (see adjacent map). Sometimes the bench mark has the initials BM in front of the measurement. Other features include roadways, water bodies, and railways.

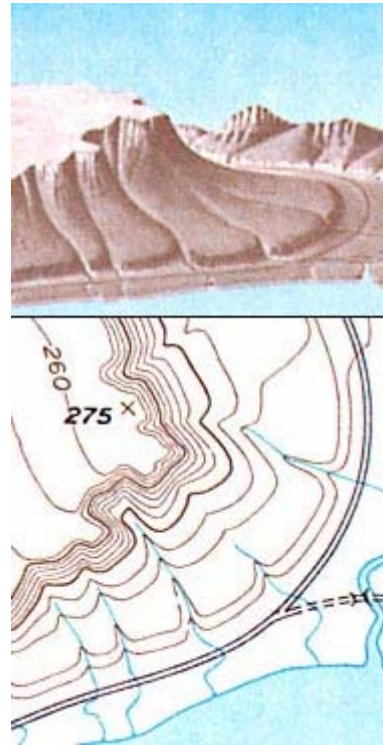


Fig 1: A visual representation of the translation between terrain and a topographic map.

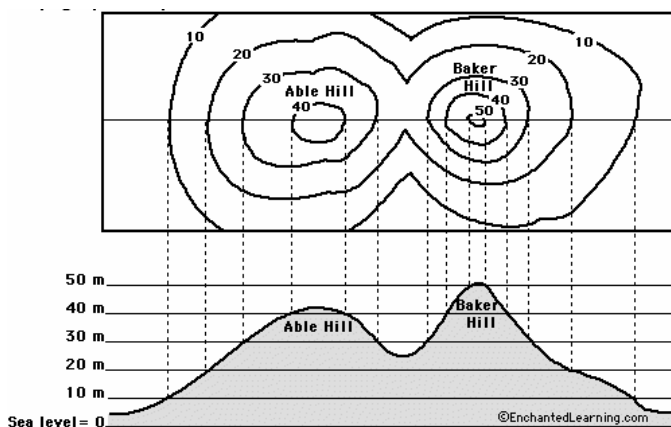


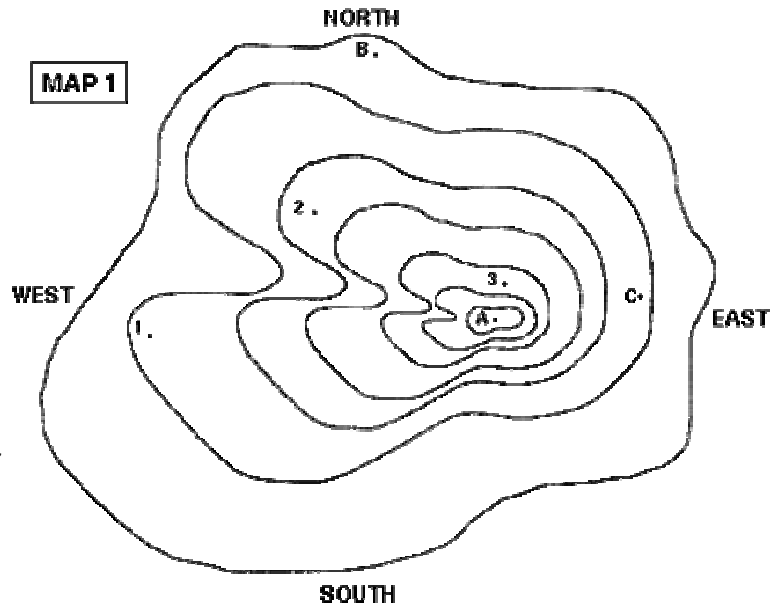
Fig 2: Two hills seen from the side with elevations marked and dotted lines pointing to the corresponding contour lines.

In addition to the lines and symbols of the topographic map, colors are also used to delineate areas of interest. Forests and other vegetated areas are green; waterbodies including oceans, rivers, lakes, streams, irrigation ditches are blue; and urbanized/densely built up areas are light red or grey. New features, added after the first publication of the map using more recent aerial photos, but not field verified are purple.

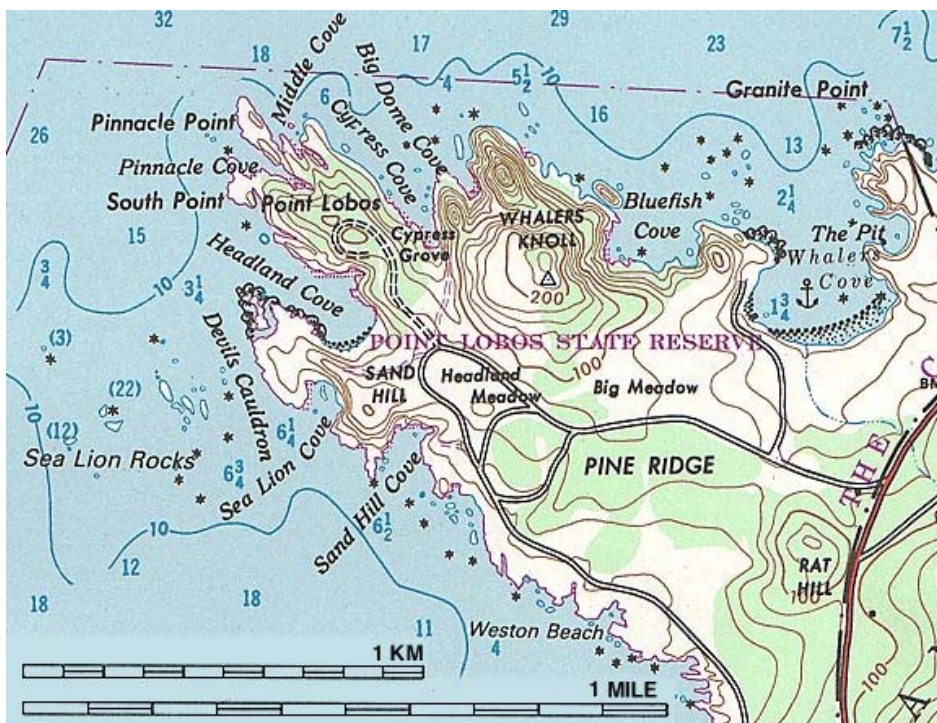
Rules of Contour Lines

Some basic rules or facts about contour lines are listed below.

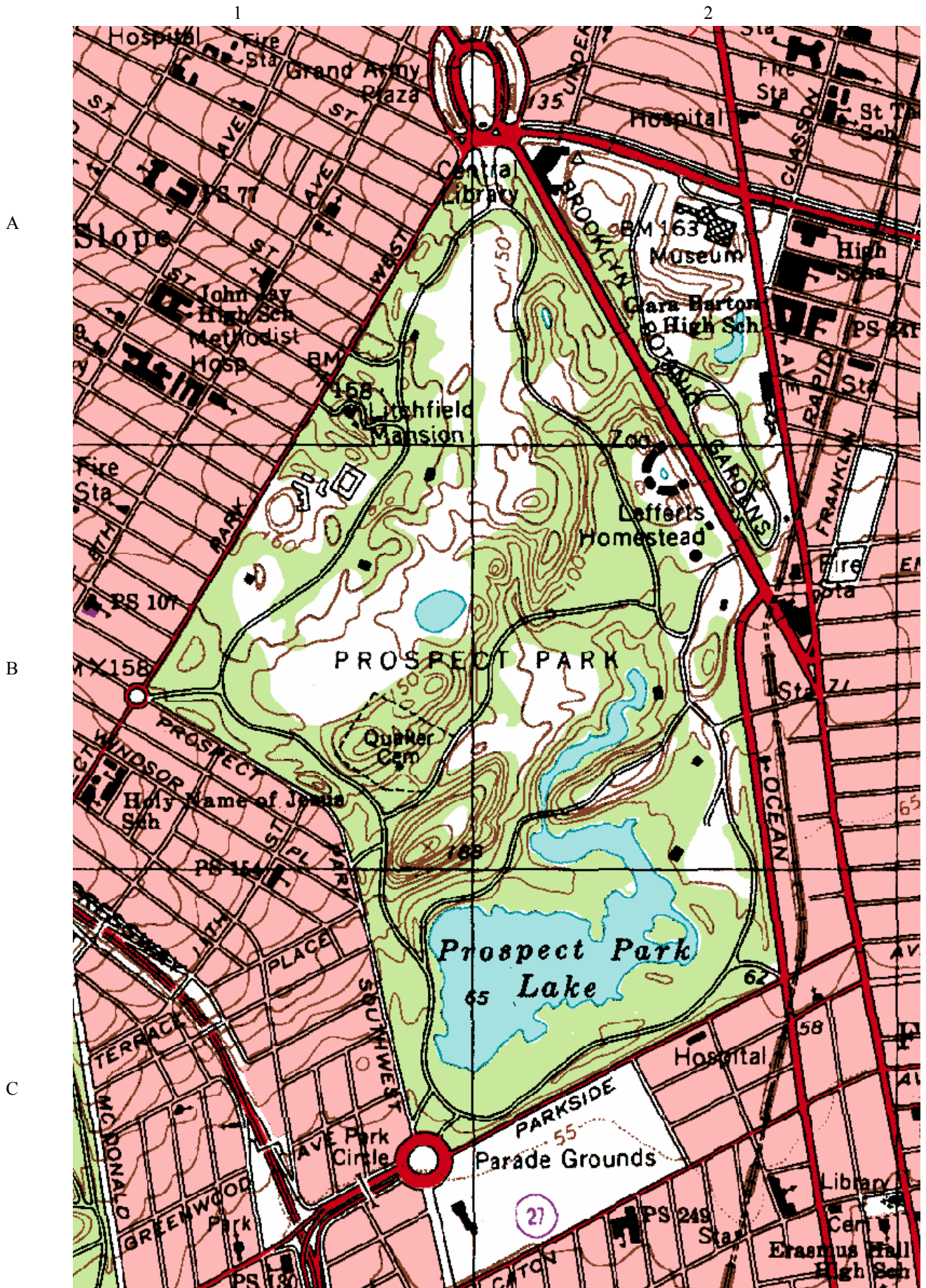
1. Where a contour line crosses a stream or valley, the contour bends to form a "V" that points upstream or valley.
2. In the upstream direction the successive contours represent higher elevations.
3. Contours near the upper parts of hills form closures. The top of a hill is higher than the highest closed contour.
4. Hollows (depressions) without outlets are shown by closed, hatched contours. Hatched contours are contours with short lines on the inside pointing downslope. The bottom of the hollow is lower than the lowest closed contour.
5. Contours are widely spaced on gentle slopes.
6. Contours are closely spaced on steep slopes.
7. Evenly spaced contours indicate a uniform slope.
8. Contours do not cross or intersect each other, except in the rare case of an overhanging cliff.
9. All contours eventually close, either on a map or beyond its margins.
10. A single higher elevation contour never occurs between two lower ones, and vice versa. A change in slope direction is always determined by the repetition of the same elevation either as two different contours of the same value or as the same contour crossed twice.



Map 1: A sample contour map showing basic contour features.



Topographic Map Sample Detail - Prospect Park



Questions to Consider

1. In which quadrant is the benchmark located?
2. Is the Quaker Cemetery up slope or down slope from the benchmark?
3. Does the neighborhood of Park Slope slope towards the park, or down towards the park?

Glossary

bench marks — precisely located points of elevation marked by brass plates fixed permanently to the ground. On a topographic map, bench marks are represented by crosses and the elevation, preceded by the letters BM, is printed in black on the map.

contour interval — the difference in elevation between adjacent contour lines on a map.

contour line — an imaginary line on the Earth's surface connecting points of the same elevation.

index contour — on a topographic map, a contour that is printed heavier than others and is usually labeled with the elevation it represents. Index contours occur at regular intervals, often every fifth or every fourth contour line (depending on the contour interval).

relief — the difference in elevation between any two points.

scale — expresses the relationship between distance on the map and the true distance on the Earth's surface.

spot elevations — elevations of road intersections, summits of hills, lake shorelines, etc. These are accurate to within the nearest foot or meter.

topographic map — the representation on a flat surface of part of the Earth's surface drawn to scale. Most topographic maps also show land boundaries and other man-made features.

Additional Resources

New York State GIS Clearinghouse:

<http://www.nysgis.state.ny.us/quads/usgsdrg.htm>

Maps for all areas of the state available in GIF format.

Cornell University Geospatial Information Repository (CUGIR):

http://cugir.mannlib.cornell.edu/browse_map/browse_map.html

Maps for all areas of the state, available in multiple formats including GIS and GIF.

United States Geological Service:

<Http://www.usgs.gov>

Official website of the USGS, a good source of information and links to additional resources.

The National Map:

<http://nationalmap.gov/>

Interactive USGS maps of the entire United States.

National Atlas:

<http://nationalatlas.gov/natlas/Natlasstart.asp>

Build your own map at the National Atlas site.