

Idea for a Lesson plan

## **Geologic cross section of Manhattan, NYC**

**Aim: How do we create a geologic cross section of Manhattan?**

**NYC Learning Standards:** <http://accelerateu.org/standards/index.cfm>

**Earth Science Core Curriculum:** <http://www.emsc.nysed.gov/ciai/mst/pub/earthsci.pdf>

### **Standard 1: Analysis, Inquiry and Design**

Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.

#### **Scientific inquiry:**

- 2B** Students interpret organized observations and measurements, recognizing simple patterns, sequences, and relationships.
- 2C** Students share their findings with others and actively seek their interpretations and ideas.

### **Standard 6: Interconnectedness: Common Themes**

#### **Models**

Key Idea 2: Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design.

- 2C** Students use different types of models, such as graphs, sketches, diagrams, and maps, to represent various aspects of the real world. Example: construct and interpret a profile.

### **Meeting the goals of the standards:**

By creating a topographic map and a geologic cross section the students will be participating in a scientific investigation in which they have to make a model and evaluate the data. The Students have to share their results with the class. They will also need to demonstrate their understanding of basic geologic processes such as the law of horizontality, folding and faulting.

### **Objective:**

1. Students will be able to draw an accurate geologic cross section by using a given data table.
2. Students will be able to relate the features of the cross section to geologic processes.
3. Students will relate the characteristics of the bedrock to the architecture

**Material:**

Map of Manhattan (NYC),  
Data Table (geological information below specific buildings in Manhattan) in progress !!!!!  
Graph paper,  
Color pencils,  
Rulers

**Time:** 2 class periods, each 45 minutes

**Vocabulary:** Students should define the following words:  
topographic or contour map  
Contour interval , elevation, depth, profile, geology, bedrock

**Procedure:**

1. Draw a profile from point A to B, using the contour lines shown on the Manhattan Map. (Use the given scale on your graph paper)
2. Plot the position of the named buildings from the Manhattan Map into your profile.
3. Draw a vertical line below each of the buildings (represents the core drills)
4. Using the information of the Data table (starting with building 1), measure the depth of each rock type and label each rock unit present. (For example, if Unit A is gravel that extends from the surface to 100 m, make a thick mark at 100 m and label “gravel” above the mark.)
5. Mark the depth of all Rock units and Rock types for all given buildings.
6. Looking at the Data Table and your profile, connect all the rock units (rock types) that are the same. (you should see a pattern)
7. Make a key for each of the rock types and color in your geologic cross section. (Remember a key is made of a symbol, a color and the name of the rock)
8. Don't forget to answer the questions below.

**Topographic map of Manhattan** (on separate sheet)

**Data Table (in progress)**

**Building 1: City Hall, Lower Manhattan**

<b>Unit</b>	<b>Rock type</b>	<b>Depth</b>
<b>A</b>		
<b>B</b>		
<b>C</b>		
<b>D</b>		
<b>E</b>		

**Building 2: Empire State Building, Manhattan**

<b>Unit</b>	<b>Rock type</b>	<b>Depth</b>
<b>A</b>		
<b>B</b>		
<b>C</b>		
<b>D</b>		
<b>E</b>		

**Building 3: Central Park, Manhattan**

<b>Unit</b>	<b>Rock type</b>	<b>Depth</b>
<b>A</b>		
<b>B</b>		
<b>C</b>		
<b>D</b>		
<b>E</b>		

**Building 4: Apollo Theater, Harlem**

<b>Unit</b>	<b>Rock type</b>	<b>Depth</b>
<b>A</b>		
<b>B</b>		
<b>C</b>		
<b>D</b>		
<b>E</b>		

**Building 5: City Hall, Lower Manhattan**

<b>Unit</b>	<b>Rock type</b>	<b>Depth</b>
<b>A</b>		
<b>B</b>		
<b>C</b>		
<b>D</b>		
<b>E</b>		

**Building 6: Washington Heights, Manhattan**

<b>Unit</b>	<b>Rock type</b>	<b>Depth</b>
<b>A</b>		
<b>B</b>		
<b>C</b>		
<b>D</b>		
<b>E</b>		

**Questions:**

1. What is the contour interval shown on the topographic map of Manhattan?
2. Describe the pattern on your geologic cross section.
3. What geologic process do you think is responsible for the shape of your pattern?
4. Describe the relationship between the height of the 6 buildings with the rock type below them.