Student Guide

Group: _____ **Country**:_____**19/02/2020**

Name:_____
_____
_____

Young "engineers" try to help IP3 users!

IP3 Users' Association asks for works on slopes

Recently, a roadside embankment at a certain point on the IP3 in Penacova collapsed, preventing the circulation of vehicles for several days. The IP3 Users Association took the opportunity to express themselves on this road, complaining about the lack of interventions on several roadside embankment in this important communication road for the economy of the many villages through. Despite the "Infraestruturas de Portugal" announcement of 2.5 million euros to finance these interventions, for more than three years, no effective work has been done so far.
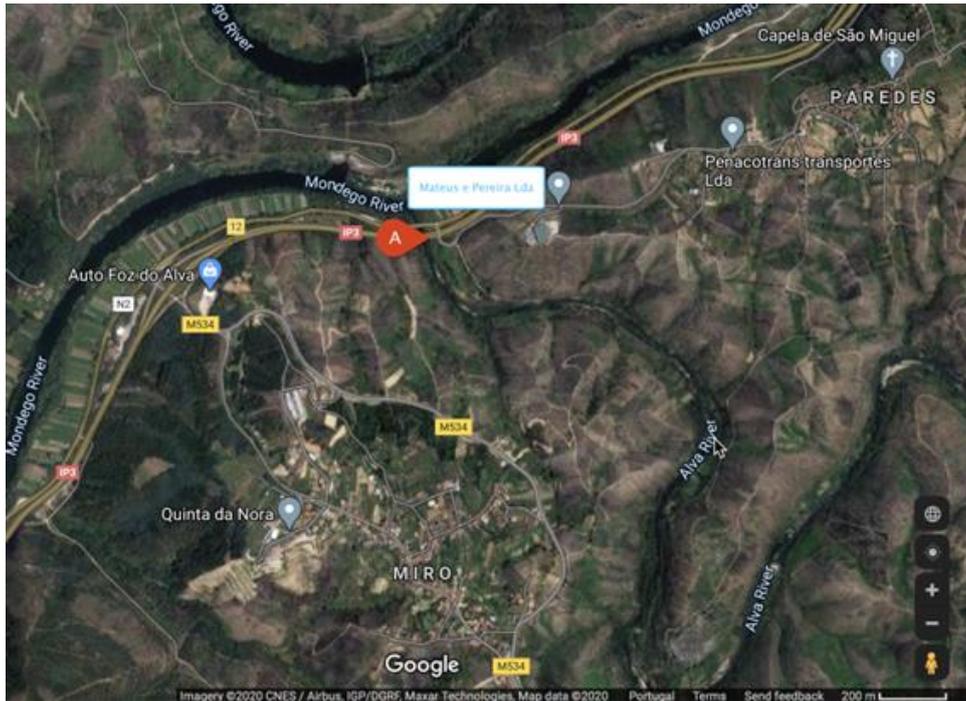
A working group of this association, having knowledge in the field of Geotechnics, and tired of waiting, intends to carry out a stability study of several embankment to define the type of containment to be carried out, in order to present concrete proposals to the "Infraestruturas de Portugal!" .

One of these embankments that demand an intervention is located at the entrance to Penacova in the South-North direction, at km 65.

https://www.google.com/maps/@40.2773088,-8.274173,3a,60.9y,320.83h,87.32t/data=!3m6!1e1!3m4!1suXv39SUXr7BPzLwzJNn-gA!2e0!7i13312!8i6656

First station – Auditorium

Take a photo of your group and share it with Literacy of the Future Edmodo Erasmus group.

Station A – Future classroom

Image 1 – Point of the road near the collapse zone

1. Pay attention to this picture and, attending that the car has 1,5 m of height, try to estimate the height of the embankment.

2. Open the file **Declive_Talude_IP3.ggb** on your laptop.

3. Consider that the line AB, is the line that supports a line segment [AB] that represents the embankment of the roadside. This line allows us to estimate the slope of the embankment in relation to the road.

   Using Geogebra find the slope of line AB in order to estimate the steepness of the roadside in that point of the route.

Suggestion:

- Remember that Slope is a measure of the steepness of a line.

   "How much does a line increase in the vertical direction for a given increase in the horizontal direction "

   Slope can be given by the relation

   $$slope = \frac{increase\ in\ vertival}{increase\ in\ horizontal} =$$

   $$= \frac{change\ in\ y}{change\ in\ x}$$

- Choose a point on the line and find how much do you increase on the vertical direction if you increase one by the horizontal direction and you want to get back on the line;

    Or

    o Choose a point on the line and find how much do you increase on the vertical direction if you increase **tow** by the horizontal direction and you want to get back on the line

    Or

- Choose a point on the line and see how much you increase on the vertical direction if you increase _____units by the horizontal direction and you want to get back to the line.

4. Move the A point or the B point through the line and find the slope attending to these new coordinates.

5. What do you see?

    Take a look to the line equation that GeoGebra gives you.

6. What is the slope of the line that goes through the following two points : $A(1,7)$ e $B(3,3)$

Station B – "Interagir" Classroom

The collapse in IP3 route is a "Natural Geological Disaster" and it´s a relatively frequent phenomenon. The landslides are movements of soil, rock or debris that occur along rupture planes (for example along a slope), which can be aggravated by the action of man.

Image 2 - Overthrown at IP3

1 – "Landslides" are considered Natural Disasters. Please identify two more Natural Disasters that may be directly or indirectly related to this one.

_____
_____

2 - Also, some of the Anthropogenic Disasters (caused by man) may be the cause of such devastation as it happens at IP3. Please refer two examples.

_____
_____

3 - Turn on the laptop and start the Mindomo application.

3.1 -Explore the Mindomo application for a while, following the examples presented by your teacher.

3.2 - Build a concept map that illustrates the classification of the different types of disasters. Use the words in the following image:
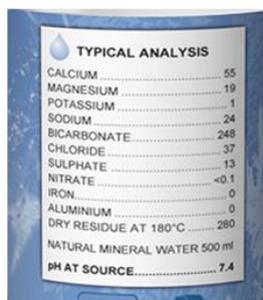

(The concept map can be enriched with images available in the folder **Imagens_Mindomo,** on your desktop.)

3.3- Save the concept map on the computer's Desktop, identifying the elements of your work group. (ex: Name1_Name2.MOM)
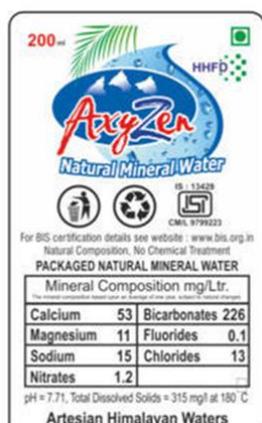
Station C – Laboratory 10 (FQ)

1. Consider the chemical composition of the following four water samples , I, II, III e IV:

Sample I — TYPICAL ANALYSIS

Component	Value
CALCIUM	55
MAGNESIUM	19
POTASSIUM	1
SODIUM	24
BICARBONATE	248
CHLORIDE	37
SULPHATE	13
NITRATE	<0.1
IRON	0
ALUMINIUM	0
DRY RESIDUE AT 180°C	280

NATURAL MINERAL WATER 500 ml

pH AT SOURCE 7.4

Sample II — AxyZen Natural Mineral Water

Natural Mineral Water
IS : 13428
CMIL 9799223
For BIS certification details see website : www.bis.org.in
Natural Composition, No Chemical Treatment
PACKAGED NATURAL MINERAL WATER

Mineral Composition mg/Ltr.

Calcium	53	Bicarbonates	226
Magnesium	11	Fluorides	0.1
Sodium	15	Chlorides	13
Nitrates	1.2		

pH = 7.71, Total Dissolved Solids = 315 mg/l at 180°C

Artesian Himalayan Waters

Sample III

Nutritionele informatie (mg/l) :
Analyse / Typical Analysis (mg/l) :

Ca^{2+}	104 mg/l
Mg^{2+}	3,7 mg/l
Na^+	3,7 mg/l
K^+	1,8 mg/l
HCO_3^-	280 mg/l
SO_4^{2-}	52 mg/l
NO_3^-	<2 mg/l
Cl^-	4 mg/l
Droogrest bij / Extrait sec à / Dry extract at 180°C	274 mg/l

pH : 7,3

Sample IV
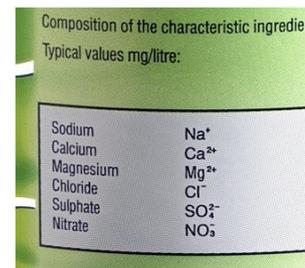
Composition of the characteristic ingredie...
Typical values mg/litre:

Sodium	Na^+
Calcium	Ca^{2+}
Magnesium	Mg^{2+}
Chloride	Cl^-
Sulphate	SO_4^{2-}
Nitrate	NO_3^-

I	II	III	IV

Which sample exhibits greater hardness?

(A) I

(B) II

(C) III

(D) IV

2. Select the correct statement:.

(A) Granitic soils contain large amounts of calcium carbonate.

(B) Soft water is rich in magnesium and calcium salts.

(C) Hard water is recognized by the quantity of foam it makes with soap.

(D) Hard water is common in soils rich in limestone.

Final station - Auditorium

Consider the following characteristics of the embankment:

Slope = _____

Vegetable coverage - reduced

Soil - poorly cohesive and poorly permeable

Knowing that the safety factor below 1.5 is considered high risk, analyse the following table:

Vegetal coverage	Slope	Soil	Safety factor
Reduced	3.01	Poorly cohesive and poorly permeable	1.0
Moderate	0.92	Cohesive, relatively permeable	1.5
High	0.71	Very cohesive, permeable	2.0

Do you think that any intervention should be carried out on the section under study? Justify your answer using information from the 3 workstations.

_____
_____
_____
_____
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Bibliographic references

https://notapositiva.com/zonas-de-vertente/

https://www.youtube.com/watch?v=aTf0h3nobAs

https://www.noticiasaominuto.com/mundo/1243240/inundacoes-e-deslizamentos-de-terra-fazem-cerca-de-40-mortos-na-indonesia