Obstacles to Transportation

Overview:

Avalanches or snow slides are common in mountainous areas and sometimes even in less mountain-like terrain. If you have snow + weather and a slope of 25 degrees or greater, you may be in an area at potential risk of an avalanche. Canada has many of these areas. First Nations people who have long inhabited this country often avoided these areas, and had no permanent settlements or transportation routes in these areas during winter. During exploration and colonization it became clear to the early explorers that the mountains posed great risk. Occasionally settlers and explorers heeded the First Nations warnings and refusal to travel in these areas; occasionally they did not - sometimes at a cost. The need to connect the country through the creation of rail and highway routes through mountains, along with the necessity to move people and goods, have all contributed to the creation of corridors with avalanche risk. Learn how we have managed avalanche risk in transportation routes over the years through observation, avoidance, defence and attack.

Part 1 - Avalanches & slide paths

Learning objectives:

- To identify what an avalanche and an avalanche path look like.
- To develop an understanding of the mountain and avalanche terrain that the Canadian Pacific Railway had to overcome in order to connect its transcontinental railway.
- To develop an understanding of the Trans-Canada Highway's path through Rogers Pass.

Background information:

Prime Minister John A Macdonald promised British Columbia that within 10 years of its joining Confederation, a railway would link the new province with the rest of the country. This would prove difficult as they would have to get through BC's extensive mountains, yet it was vital to move people and supplies and have a way to communicate with the rest of this vast land. Surveyors were sent by the Canadian government to find a route west of the Rocky Mountains. Walter Moberly was hired in 1871 and chose Eagle Pass (near Sicamous, BC) in the Monashee Mountains as a waypoint. The shortest route from Kicking Horse Pass (near Golden, BC) to Eagle Pass was through the Selkirk Mountains. Major A.B. Rogers, hired by the CPR, used

Moberly's reports to help find and establish Rogers Pass as the route to connect the railway through the Selkirks. In 1885, the transcontinental rail line was built through Rogers Pass. Today, not only does the railway go through Eagle Pass, Rogers Pass and Kicking Horse Pass, but so does the Trans-Canada Highway (completed in 1962). Both the railway and highway require highly skilled avalanche professionals to keep them open, as there are approximately 240 slide paths between Eagle Pass and Kicking Horse Pass.

Lesson activities:

A) Map exploration of avalanche terrain.

- After understanding why the CPR was needed and built through Rogers Pass, take a look at a map of the geography of Canada to understand where the mountainous areas are west of the Rocky Mountains.
- Identify the three passes: Kicking Horse Pass, Rogers Pass and Eagle Pass and Golden, Revelstoke and Sicamous in British Columbia. Identify the Selkirk and Monashee Mountains (Columbia Mountains). Do this on a physical map and then try "flying over" these with Google Earth (51.285983°N 117.513058°W, is around the summit of Rogers Pass) and/or on a topographic map (National Topographic Series 82N/3, 82 N/4, 82 N/5, 82N/6). Do this to get a sense of the avalanche and mountain terrain in this area.
- Identify avalanche paths in both Google Earth and on a topographic map.
- Identify the rail route and the Trans-Canada Highway route through this area. Do you think that the Canadian Government was right to use Rogers Pass, or would another route such as Moberly Pass have been better?

B) Write in role.
Major A.B. Rogers' spring expeditions to find a suitable route for the CP Rail line were difficult due to the large snowpack, and they would often travel in the early morning hours to avoid the warmer parts of the day. In his report to the CPR, Rogers stated, "Work through the Selkirks will be heavy and expensive". Using your knowledge of the area gained from the map exploration activity, explain to the CPR personnel why work would be "heavy and expensive".

Part 2 - Avalanches as Obstacles to Transportation.

Learning objective:

The learner will gain knowledge on how avalanches have been and can be an obstacle to transportation.

Lesson activities:

Mind Map and Questions/Discussion

- Discuss as a group and create a mind map of all the potential transportation routes (industrial, recreational & everyday) that avalanches could be an obstacle to.
- View the Learning Object Collection (LOC), and add missing transportation routes to your mind map from the LOC.
- Answer the question either as a group or individually: Why do humans continually put themselves at risk using transportation routes through avalanche terrain?

Parts 3, 4 & 5: Observe, Avoid, Defend & Attack

Learning Objectives:

- Learn how Canadians have been observing and documenting snow and avalanches since 1885, and continue to observe snow today to continue to help people stay safe in avalanche terrain and avoid avalanches as obstacles to transportation**.**
- Discover how avoiding avalanches means avoiding the obstacle to transportation.
- Understand how First Nations people were aware of avalanches as obstacles to transportation and knew their deadly repercussions.
- Discover that during colonization, First Nations people would refuse to guide Europeans into avalanche areas on days of danger.
- Determine some of the methods used by the Canadian Pacific Railway (CPR) to avoid avalanche terrain in the early days of running the transcontinental rail line through Rogers Pass, in order to connect British Columbia to the rest of Canada.
- Understand that the rail line was essential to BC joining Confederation, yet the high mountain passes with their avalanche terrain proved difficult for the construction and operation of the Canadian Pacific Railway.
- Understand how a snowshed keeps highways and railways safer from avalanches.
- Understand that defending both highways and railways is essential to keep the flow of traffic and goods through our country.
- Gain knowledge of the defence techniques both the railway and highway have used in avalanche areas.
- Examine different methods used by avalanche professionals to attack the snow and force it to avalanche or slide in controlled conditions to keep road users safe.

Pre-amble:

Avalanches have been obstacles to transportation for as long as people have been in the mountains. How we deal with the obstacle has evolved greatly over time.

Before taking action, we must observe snow to understand avalanche cycles, activity and terrain. Once we have some understanding we can choose to avoid… or not.

Lesson Activities:

A) Graphic Organizer
Topics: Observe, Avoid, Defend & Attack

- After viewing the Learning Object Collection, create a graphic organizer on observing, avoiding, defending and attacking avalanche paths along the highway & rails. (Mind map, interactive notebook, bubble, fishbone, etc.)
- Q: Why do you think there are so many different ways to defend our transportation routes and attack obstacles?
- Q: What do you think has changed in our observation of snow and avalanches over time? (Idea of more detailed observations, more organized, more protocol and that snow is a science today.)
- Q: What has resulted from these observations? (Different ways to deal with snow and avalanches such as avoiding – reading the avalanche bulletin before heading into the backcountry; highway closures to make the road safe; not stopping in avalanche area; identifying avalanche area through signage; using detailed maps of avalanche terrain. Understanding where avalanche paths are so that loops and tunnels could be built to avoid avalanches.)
- Compare Loops versus Tunnel; why do you think the Loops were abandoned?

B) Create a Brochure:
Create a brochure on how the Ministry of Transportation & Highways and Parks Canada, with help from the Canadian Army, keep our roads safe. Use the information from Observe, Avoid, Defend & Attack in the Learning Object Collection.

(If you live near Glacier National Park, take a field trip up to the abandoned Loops – contact Parks Canada for an educational program and guided tour to the Loops).

C) Research & Writing Assignment:
Background information - In 1910, a series of super storms led to a number of fatal avalanches. It is believed that the construction of Connaught Tunnel was in part a response to these fatalities.

- Have students do a research project on the 1910 avalanches and/or gain more information from the Land of Thundering Snow website.
- Q: Why do you think a giant tunnel has not been built through this section of highway and railway in Rogers Pass?

D) Newspaper/Newspaper Article

Create a newspaper article or a newspaper from March 1910. Include the human aspect - the fear that people may have had of travel in this area, the heroes of the day and the losses - and what people may have been saying about this stretch of railway.

Part 6: Cleaning up after the Obstacle (avalanche)

Learning Objectives:

- Understand how a planned or unplanned avalanche/snowslide event is removed as an obstacle to transportation.
- Gain knowledge on how the clean up of snow and debris from highways and rail lines has become more mechanized.
- Develop an appreciation of some of the feelings of avalanche professionals and bulldozer operators in different circumstances after an avalanche/snowslide event.

Pre-amble:

Be it a planned or unplanned event, when an avalanche hits the highway or railway it must be removed. How we remove the obstacle has changed greatly as technology has evolved. It has gone from gangs of men digging out railway cars, to rotaries and wedge ploughs, to combinations of ploughs and heavy machinery. Today, anyone operating in avalanche terrain on the highway or railway should have avalanche training and avalanche safety gear.

Lesson Activity:

Write in Role: You are either John Anderson or Louis Deschamps after being buried or witnessing burial. Write a postcard to your brother about your job and the experience you have just had. Include an appropriate picture on the front of the postcard.

Or

You have a portion of the letter John Anderson, the CPR Road Master, wrote to his superior on March 14, 1910. Write the rest of the letter. His brother was killed in these avalanches. (The Road Master is in charge of the track and keeping it clear, and is in charge of all the staff that help with this).

Culminating Activities:

- Refer to **Obstacles to Transportation quiz** and **answer key**. Use while going through each object in the Learning Object Collection (individually or all together).
- Six-sided Knowledge Cube.
  Have students display knowledge gained from the Learning Object Collection in a six-sided cube. Use drawings to help make the knowledge more visual. Titles for the 6 sides are the section headings:
    1. Avalanches and Slide Paths
    2. Avalanches as *Obstacles to Transportation*
    3. Observe & Avoid
    4. Defend
    5. Attack
    6. Cleaning up after an avalanche, removing the Obstacle

- Board Game.
  Using your knowledge of the Learning Object Collection and lots of creativity, create a board game about travel in avalanche country. The focus could be on building a railway through Rogers Pass, keeping a section of road to a mine clear or keeping a section of highway safe and clear.

- Interactive Notebook.
  Create a section of interactive notebook on Obstacles to Transportation. Ideas to express learning:
    - View Fold the Wish on YouTube and create an origami crane to remember 1910 avalanche victims.
    - Create a 'foldable' for Attack with a fold for each method.
    - Print out map of pre-1916 snow sheds in the LOC and have students label: avalanche paths, snow sheds, the highway or where the tunnel is located today.