

## Teaching Outline: Steep Grades and Switchbacks

<b>Date:</b>	
<b>Teaching Topic:</b>	Steep Grades and Switchbacks
<b>Type of Session/Audience:</b>	Tailgate Session Grade Crew/Supervisors, Planners
<b>Session Length:</b>	15-20 minutes
<b>Materials Required:</b>	<ul style="list-style-type: none"> <li>• OHS regulations/Guidelines for reference (see appendix 2)</li> <li>• Flipcharts and pens</li> <li>• Narrative notes from video (see appendix 1)</li> <li>• Video: Communication Between Phases - Steep Grades and Switchbacks</li> <li>• Computer/TV with DVD player to play video</li> </ul>
<b>Session Requirements:</b>	<ul style="list-style-type: none"> <li>• Meeting room of sufficient size to comfortably seat the size of the group</li> <li>• Instructor will need to take notes of discussion items</li> <li>• Instructor will need to take note of any unresolved questions and seek answers</li> </ul>
<b>Learning Objectives:</b>	<ul style="list-style-type: none"> <li>• To discuss issues related to building Steep Grades and Switchbacks</li> <li>• To emphasize the importance of communication during road construction</li> <li>• To ensure that risk assessments for roads with grades greater than 18% is understood</li> </ul>
<b>Class Outline &amp; Suggested Times:</b>	<ul style="list-style-type: none"> <li>• Introduce and explain the purpose of this module (1-2 minutes)</li> <li>• Present video (2:45 minutes)</li> <li>• Present teaching notes (8-10 minutes)</li> <li>• Open up Discussion (4-5 minutes)</li> <li>• Competency Evaluation (2-3 minutes)</li> <li>• Closing remarks (1-2 minutes)</li> </ul>

### Detailed Class Outline:

<p><b>1. Introduce and explain purpose of the module</b></p>	<ul style="list-style-type: none"> <li>• To discuss potential safety issues when building steep roads and switchbacks.</li> <li>• To re-inforce the importance of communication during construction</li> </ul>
<p><b>2. Present Video</b></p>	<ul style="list-style-type: none"> <li>• Communication Between Phases – Steep Grades and Switchbacks</li> </ul>
<p><b>3. Present Teaching Notes</b> (see Appendix 1)</p>	<ul style="list-style-type: none"> <li>• Highlight main ideas from the video that will help lead your discussion</li> </ul>
<p><b>4. Open up Discussion, using the following as a guide</b></p>	<ul style="list-style-type: none"> <li>• Do we have issues with table tops, leans or traction?</li> <li>• Do planners review the construction of steep roads and switchbacks in the field?</li> <li>• Do senior planners consult ahead of time when steep roads are being proposed?</li> <li>• Can you think of any other hazards that exist but were not mentioned by the video?</li> </ul>
<p><b>5. Competency Evaluation</b></p>	<ul style="list-style-type: none"> <li>• List and explain some of the things that this video referred to that could help improve our construction of steep roads and switchbacks.</li> <li>• What needs to happen if a road builder encounters something that is causing a safety concern?</li> </ul>
<p><b>6. Closing Remarks</b></p>	<ul style="list-style-type: none"> <li>• Reminder: the best time to give and receive feedback is when the road crew is still onsite.</li> <li>• Regulations must always be followed.</li> <li>• Ensure the plan is understood by all concerned.</li> </ul>

## Appendix 1: Steep Grades and Switchbacks FACILITATOR NOTES

### KEY THEME:

Steep grades and switchback present potential hazardous conditions, it important that road builders, planners and supervisors communicate with one another during the construction phase to ensure roads are constructed to ensure worker safety.

### VIDEO NARRATIVE NOTES:

The layout and construction of steep roads and switchbacks must take into account weather conditions when road will be used, road transitions to steep sections or switchbacks, leans in switchbacks and traction.

We want to discuss today some of the appropriate risk assessments that should be conducted in planning log hauling operations on varying road grades to ensure worker safety.

Potential hazards that both planners and road builders need to be concerned with are:

- Road is designed for the appropriate weather that will be present when hauling is taking place,
- Table tops-where the grade transition is too rapid,
- Leans in switchbacks remain level through the switchback and the grade remains consistent through the switchback,
- Ensure the material provides the appropriate traction to ensure safe travel,

Remember is there is a concern planners can come back to reassess the situation.

## Appendix 2: Steep Grades and Switchbacks FACILITATOR NOTES

### Part 26 Forestry Operations and Similar Activities

#### 26.2 Planning and conducting a forestry operation

- (1) The owner of a forestry operation must ensure that all activities of the forestry operation are both planned and conducted in a manner consistent with this Regulation and with safe work practices acceptable to the Board.
- (2) Every person who has knowledge and control of any particular activity in a forestry operation must ensure that the activity is both planned and conducted in a manner consistent with this Regulation and with safe work practices acceptable to the Board.
- (3) The planning required under this section must
  - (a) include identification of any work activities or conditions at the workplace where there is a known or reasonably foreseeable risk to workers,
  - (b) be completed before work commences on the relevant activity, and
  - (c) be documented at the time of planning.
- (4) If, after any planning referred to in subsection (3), there is a change in the workplace circumstances, including the work activities and the conditions of the workplace, and the change poses or creates a known or reasonably foreseeable risk to workers that was not previously identified, then
  - (a) the plan must be amended to identify and address the risk and provide for the health and safety of the workers at the workplace, and
  - (b) the amendment must be documented as soon as is practicable.

### Roads and Road Maintenance

#### G26.2-2 Planning log hauling operations for varying road grades

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Regulatory excerpt

Section 26.2 of the OHS Regulation ("Regulation") states:

- (1) The owner of a forestry operation must ensure that all activities of the forestry operation are both planned and conducted in a manner consistent with this Regulation and with safe work practices acceptable to the Board.
- (2) Every person who has knowledge and control of any particular activity in a forestry operation must ensure that the activity is both planned and conducted in a manner consistent with this Regulation and with safe work practices acceptable to the Board.
- (3) The planning required under this section must

(a) include identification of any work activities or conditions at the workplace where there is a known or reasonably foreseeable risk to workers,

(b) be completed before work commences on the relevant activity, and

(c) be documented at the time of planning.

(4) If, after any planning referred to in subsection (3), there is a change in the workplace circumstances, including the work activities and the conditions of the workplace, and the change poses or creates a known or reasonably foreseeable risk to workers that was not previously identified, then

(a) the plan must be amended to identify and address the risk and provide for the health and safety of the workers at the workplace, and

(b) the amendment must be documented as soon as is practicable.

#### Purpose of guideline

The purpose of this guideline is to provide direction about appropriate risk assessments that should be conducted in planning log hauling operations on varying road grades to ensure worker safety.

#### Risk assessment

If log haul operations are to be conducted on road grades that exceed those listed in the Ministry of Forests' Forest Road Engineering Guidebook, a risk assessment should be conducted before any hauling is conducted. The risk assessment factors will depend on the grade of the road, namely

1. Grades 0 to 18% (18% for short pitches is the maximum listed in the Forest Road Engineering Guidebook)

The following conditions should be in place to ensure log haul operations on these grades do not present a safety concern:

- The vehicle can be brought to a safe stop on the road surface and grade given the weather conditions at that time.
  - The vehicles are properly maintained.
  - Speed is not excessive (excessive speed for this guideline is considered as speed above the design speed, above which the operator is not in adequate control of the vehicle, or speed above which the unit could not be brought to a safe stop given a single failure in the driveline).
  - Vehicle loads are within the limits of the equipment.
2. Grades in excess of 18% (grades exceeding road grades listed in the Ministry of Forests' Forest Road Engineering Guidebook):

There are many factors that contribute to safe operations on these grades, including: weather conditions; road surface friction; grade and horizontal alignment; side slope; velocity of the vehicle; load carried by the vehicles; size, style and condition of brakes; obstacles ahead; and location and size of drop-offs.

The employer must perform a risk assessment to ensure that the equipment being used is capable of performing in a safe manner given weather conditions at the time of log hauling. This assessment should include the following:

Specifications regarding the road surface condition;

- Vehicle speed
- Length of pitch
- Road relief
- Curve radius
- Comments on specific terrain hazards to negotiate

The risk assessment should not rely solely on the fact that trucks or other equipment may have negotiated similar roads without incident during past operations.

The risk assessment should also address the situation where if an upset condition (such as adverse weather conditions or a failure in the driveline) were to occur, how that upset condition would be controlled or mitigated. The risk assessment needs to confirm that the vehicle or other equipment can be brought to a safe stop under the anticipated hauling or upset conditions. If hauling conditions fall outside the anticipated parameters of the risk assessment, a reassessment should be conducted before hauling continues.

A clear work procedure must be developed based upon the risk assessment described above and include specific instructions for all factors included in the risk assessment. In addition, the risk assessment should include instructions for correct brake adjustment, and if necessary, brake temperature checks. The risk assessment and subsequent work procedure should be discussed and agreed upon with the loading and hauling crews.

Once completed, the risk assessment must confirm that the vehicles or other equipment travelling on these slopes are capable of doing so safely before hauling operations begin.