

ES473 Topographic Measurements and Slope Profiling Exercise

Using the attached copy of the northeast quadrant of the Falls City Quadrangle, complete the following map-related activities.

- Using a ruler and graphical scale of the map, determine the fractional scale. Show all of your math work and unit algebra. Place answer below.

$$1 \text{ km} = 8 \text{ cm}$$

$$1 \text{ km} \left(\frac{1000 \text{ m}}{1 \text{ km}} \right) \left(\frac{1000 \text{ cm}}{1 \text{ m}} \right) / 8 \text{ cm} = 12500$$

SCALE 1: 12500

- What is the contour interval of the map? 40 ft 600-400/5
- Examine the course of the Little Luckiamute River. Using a colored pencil, carefully highlight the trace of the main channel of the Little Luckiamute.
 - Which direction is the river flowing? Southwest
- Calculate the gradient of the Little Luckiamute channel, between points 2 and 3. Fill in the data table below. Show all of your math work.

Elevation of Point 2 340 Ft

Distance Between Pt. 2 and 3 4306.1 Ft
 $10.5 \text{ cm} (12500) \left(\frac{1 \text{ in}}{2.54 \text{ cm}} \right) \left(\frac{1 \text{ ft}}{12 \text{ in}} \right)$

Elevation of Point 3 280 Ft

Stream Gradient 0.139 Ft / Ft or 1.39%
 $60 \text{ ft} / 4306.1 \text{ ft} =$

Elevation Difference between pt. 2 and 3 60 Ft
 $340 \text{ ft} - 280 \text{ ft}$

Stream Gradient 73.6 Ft / Mi
 $60 \text{ ft} / 4306.1 \text{ ft} \left(\frac{1 \text{ mi}}{5280 \text{ ft}} \right) = 73.57$

- Determine the hillslope gradient between points X-Y and points M-N. Show all of your math work and unit algebra.

Elevation Difference X-Y 200 ft

Gradient X-Y 20.6° degrees

Calc made degree: 37.52
 $\tan^{-1}(37.52) = 20.506^\circ$

Elevation Difference M-N 240 ft
 $680 - 440$

Gradient M-N 39.9 degrees

$\tan^{-1}(39.9) = 39.996^\circ$

Which hillslope segment is steeper X-Y or M-N?

M-N is significantly steeper

Horizontal Distance X-Y 533 ft
 $(12500) 1.5 \text{ cm} \left(\frac{1 \text{ in}}{2.54 \text{ cm}} \right) \left(\frac{1 \text{ ft}}{12 \text{ in}} \right) = 533.1 \text{ ft}$

Gradient X-Y 37.52 percent

$$200 \text{ ft} / 533.1 \text{ ft} \cdot 100 = 37.516\%$$

Horizontal Distance M-N 287 ft

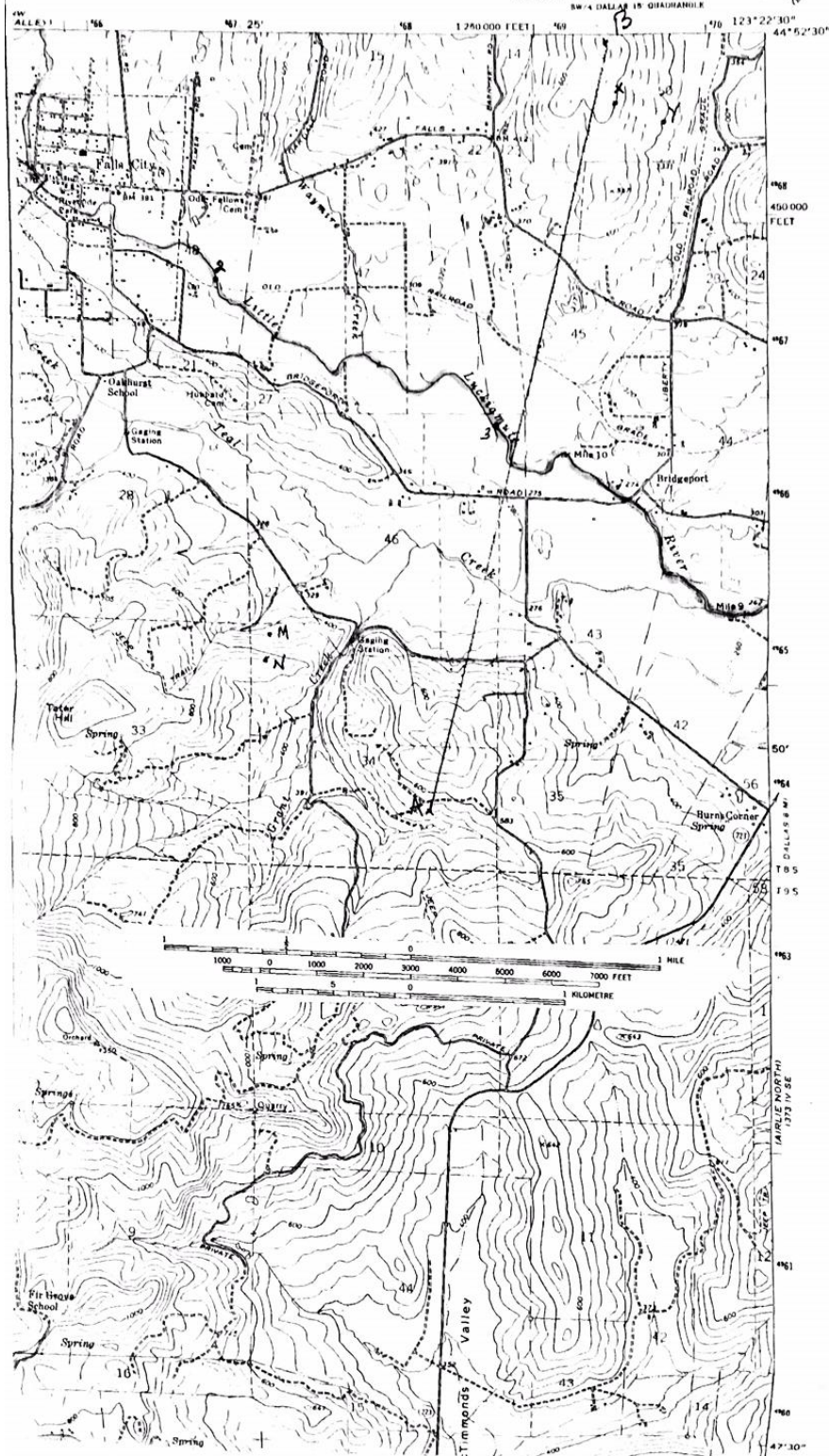
$.7 \text{ cm} (12500) \left(\frac{1 \text{ in}}{2.54 \text{ cm}} \right) \left(\frac{1 \text{ ft}}{12 \text{ in}} \right) = 287.073 \text{ ft}$

Gradient M-N 83.6 percent

$$240 \text{ ft} / 287.1 \text{ ft} \cdot 100 = 83.602\%$$

- Draw a topographic profile along line A-B using the attached graph paper.

FALLS CITY QUADRANGLE
OREGON POLK CO
7.5 MINUTE SERIES (TOPOGRAPHIC)





FALLS CITY QUADRANGLE
OREGON-POLK CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW 1/4 DALLAS 15' QUADRANGLE

1373 IV NE
(DALLAS)

123°22'30" 44°52'30" 1250000 FEET 1373 IV SE (DALLAS)



Contour Interval: 40 ft

Index Contour: 200 ft

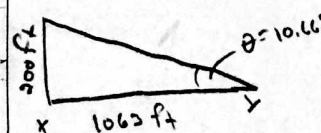
8.8 cm per 700 ft

$$700 \text{ ft} \times \frac{12 \text{ in}}{\text{ft}} \times \frac{2.54 \text{ cm}}{\text{in}} = 21336 \text{ cm}$$

$$\frac{450000 \text{ FEET}}{8.8 \text{ cm}} \times \frac{21336 \text{ cm}}{1} = 1:24000$$

$$\overline{XY} = 1.35 \text{ cm}$$

$$1.35 \text{ cm} \times \frac{1 \text{ in}}{2.54 \text{ cm}} \times \frac{1 \text{ ft}}{12 \text{ in}} \times 24000 = 1063 \text{ ft}$$

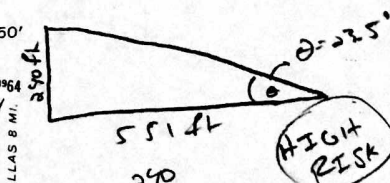


$$\tan \theta = \frac{200 \text{ ft}}{1063 \text{ ft}}$$

$$\theta = \tan^{-1} \left(\frac{200 \text{ ft}}{1063 \text{ ft}} \right) = 10.6^\circ$$

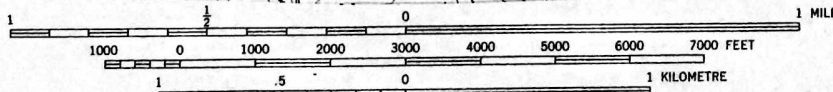
$$\overline{MN} = 0.7 \text{ cm}$$

$$0.7 \text{ cm} \times 24000 \times \frac{1 \text{ in}}{2.54 \text{ cm}} \times \frac{1 \text{ ft}}{12 \text{ in}} = 551 \text{ ft}$$



$$\tan \theta = \frac{250}{551}$$

$$\theta = \tan^{-1} \left(\frac{250}{551} \right) = 23.54^\circ$$



Profile Topography - Fair City Quadrangle

Zone Based on slope angle

