

DRIVEWAY GRADES

CALCULATIONS

This is a guide to designing driveways in order to ensure the design complies with District guidelines. The criteria is as follows:

- driveway crossing permit fee: \$80
- maximum grade from edge of pavement for 2 m: 2%
- maximum grade of driveway: 20%
- A 4.9 m apron is required out of the garage with the following maximum grades:
 - for driveways sloping down from road the maximum apron grade: 8%
 - for driveways sloping up to garage the maximum apron grade: 5%
- Vertical transitions are required to reach the maximum grades, and are required to follow the TAC manual for Canada. The TAC manual states that, for driveways on local roads, the maximum grade change of 12% over a horizontal distance of 3 m satisfies vertical clearance requirements for most vehicles.

for grade change 2-20% condition

minimum length of transition for 2-20%

grade change = 18%

$L_{\min} = 3 \text{ m}/12 \times 18$

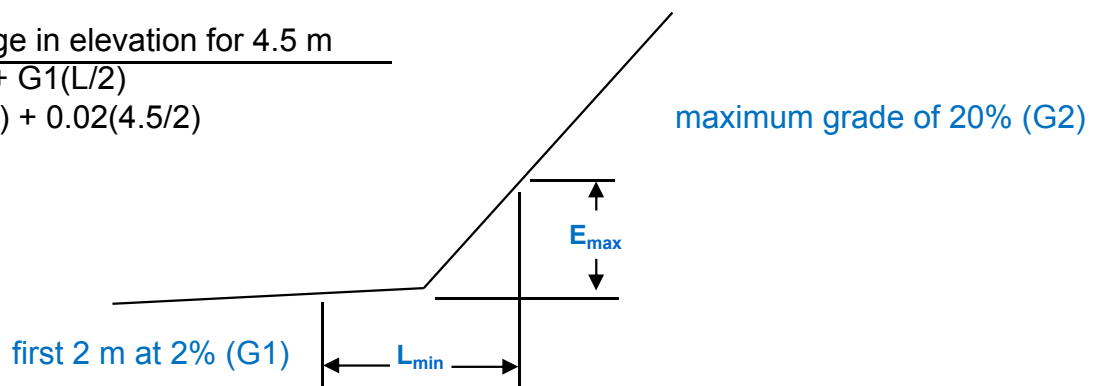
$L_{\min} = 4.5 \text{ m}$

maximum change in elevation for 4.5 m

$E_{\max} = G2(L/2) + G1(L/2)$

$E_{\max} = 0.2(4.5/2) + 0.02(4.5/2)$

$E_{\max} = 0.495 \text{ m}$



DRIVEWAY GRADES

CALCULATIONS *continued*

for grade change 5-20% (apron) condition

minimum length of transition for 5-20%

grade change = 15%

$$L_{\min} = 3 \text{ m} / 12 \times 15$$

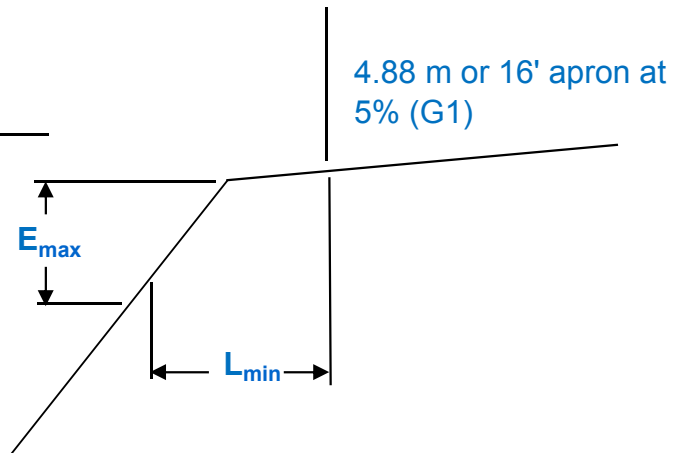
$$L_{\min} = 3.75 \text{ m or } 12.3'$$

maximum change in elevation for 3.75 m

$$E_{\max} = G2(L/2) + G1(L/2)$$

$$E_{\max} = 0.2(12.3/2) + 0.05(12.3/2)$$

$$E_{\max} = 0.47 \text{ m or } 1.54'$$



maximum grade of 20% (G2)

for grade change 8-20% (apron) condition

minimum length of transition for 8-20%

grade change = 12%

$$L_{\min} = 3 \text{ m} / 12 \times 12$$

$$L_{\min} = 3.0 \text{ m}$$

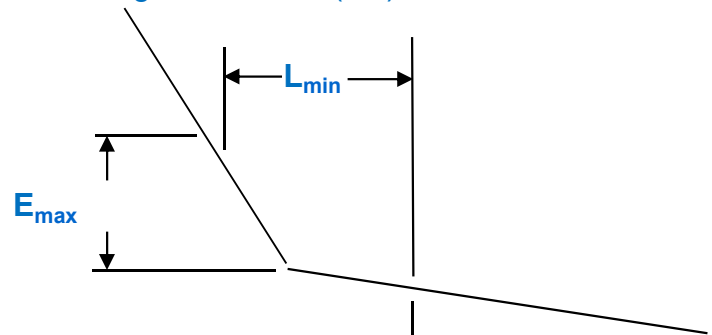
maximum change in elevation for 3 m

$$E_{\max} = G2(L/2) + G1(L/2)$$

$$E_{\max} = 0.2(3/2) + 0.08(3/2)$$

$$E_{\max} = 0.42 \text{ m}$$

maximum grade of 20% (G2)



4.9 m apron at 8% (G1)

CALCULATIONS *continued*

for grade change 0-20% condition

minimum length of transition for 0-20%

grade change = 20%

$$L_{\min} = 3 \text{ m}/12 \times 20$$

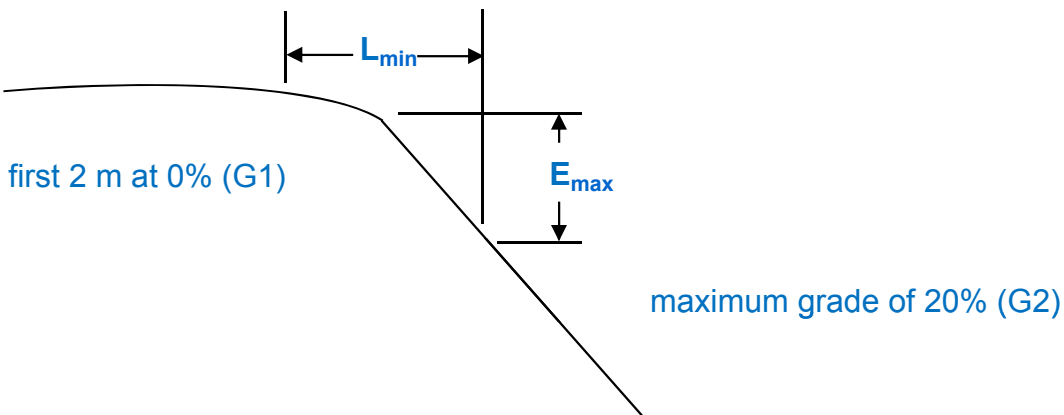
$$L_{\min} = 5.0 \text{ m}$$

maximum change in elevation for 5.0m

$$E_{\max} = G_2(L/2) + G_1(L/2)$$

$$E_{\max} = 0.2(5/2)$$

$$E_{\max} = 0.5 \text{ m}$$



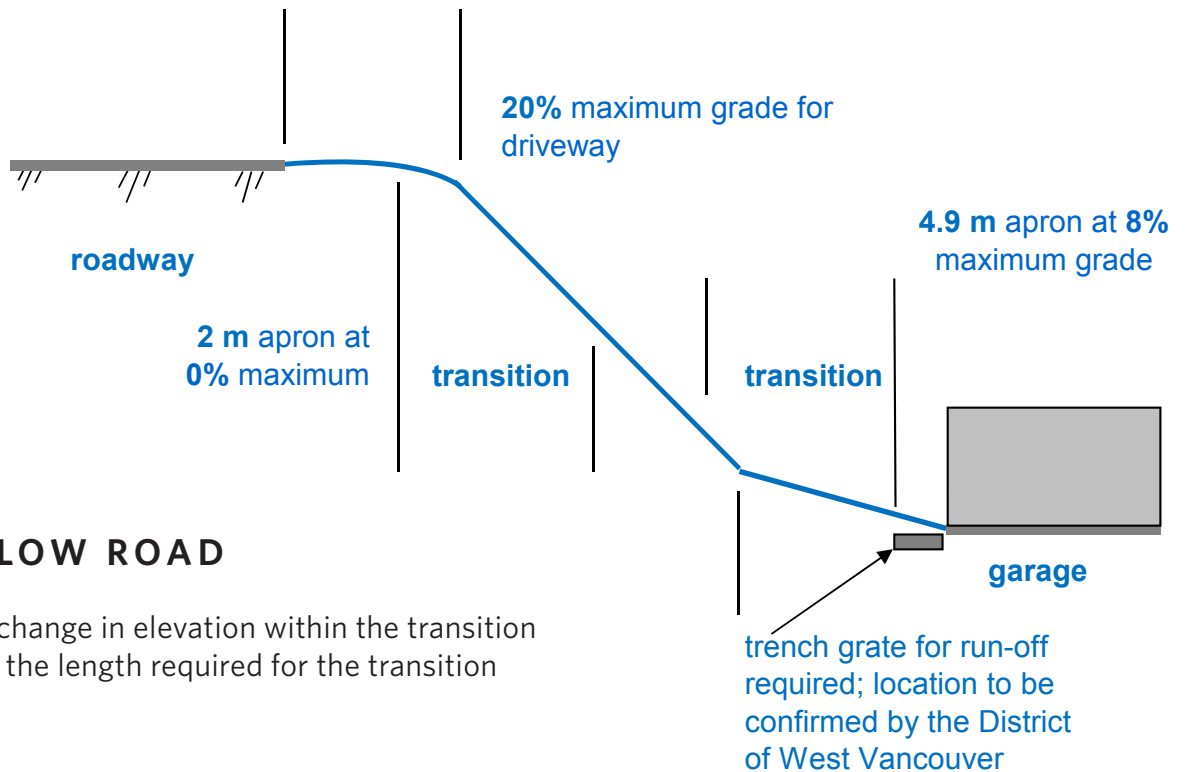
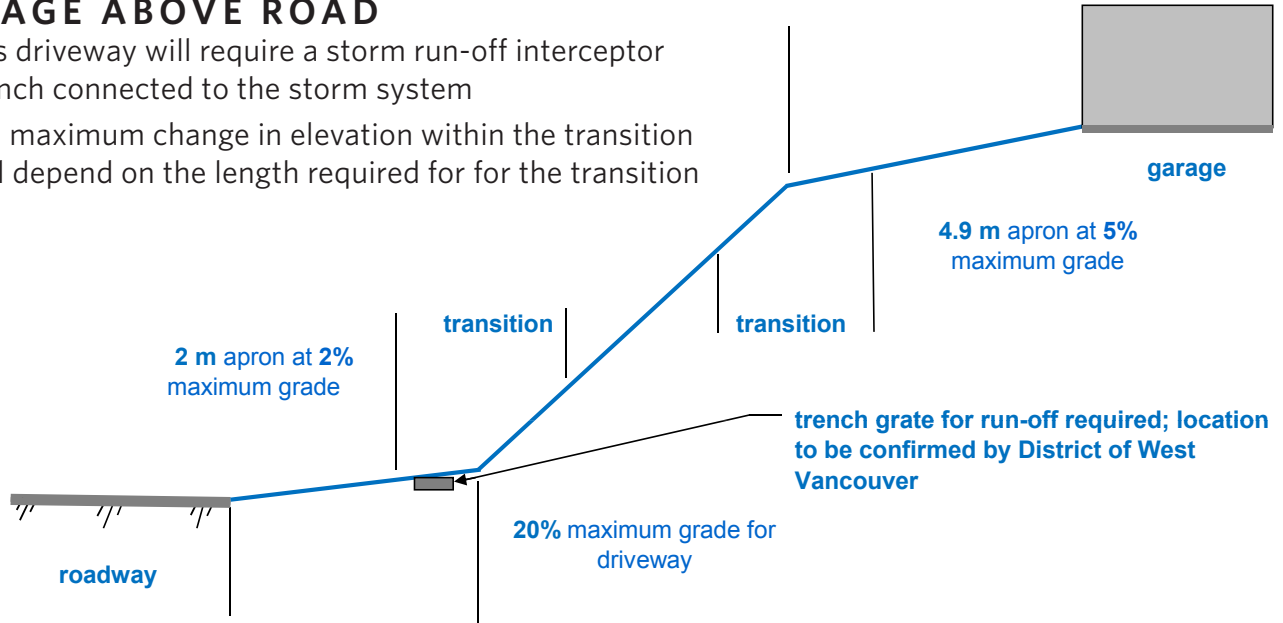
The 0% for first 2 m is to create a drainage bump at the road to keep drainage on the road.

DRIVEWAY GRADES

DRIVEWAY CONDITION FOR:

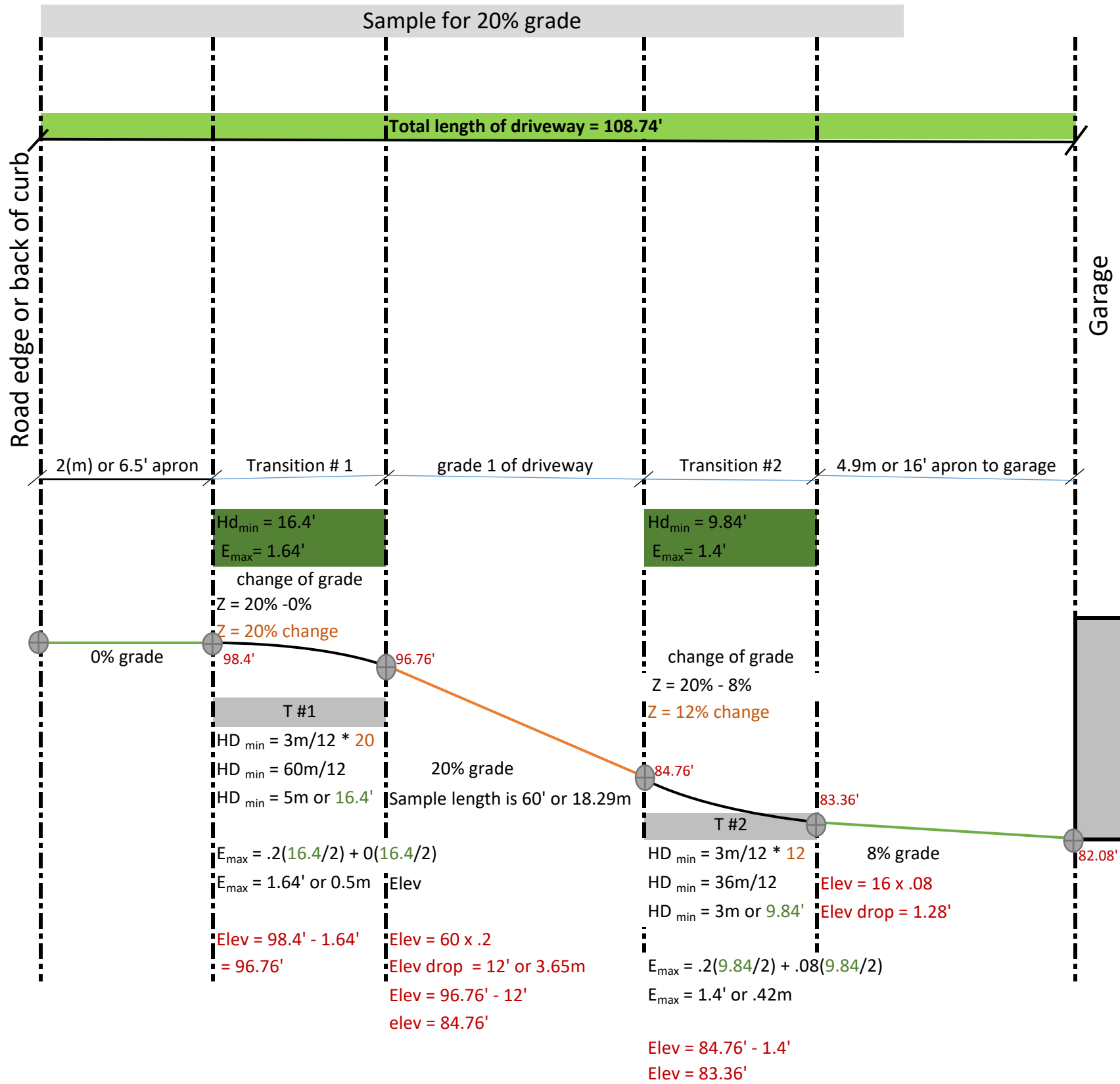
GARAGE ABOVE ROAD

- this driveway will require a storm run-off interceptor trench connected to the storm system
- the maximum change in elevation within the transition will depend on the length required for for the transition



GARAGE BELOW ROAD

- the maximum change in elevation within the transition will depend on the length required for the transition

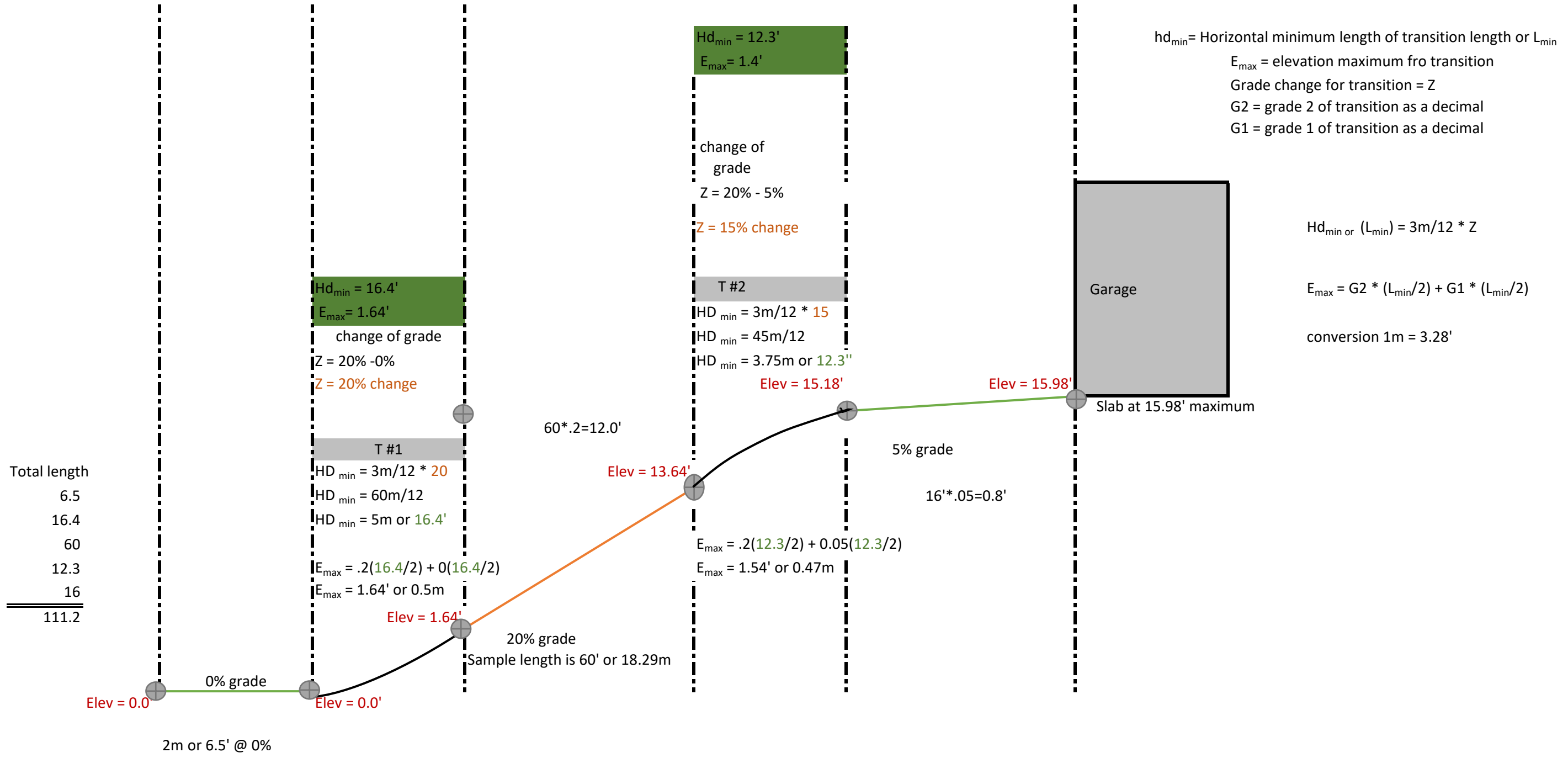


hd_{min} = Horizontal minimum length of transition length or L_{min}
 E_{max} = elevation maximum from transition
 Grade change for transition = Z
 G2 = grade 2 of transition as a decimal
 G1 = grade 1 of transition as a decimal

$hd_{min} \text{ or } (L_{min}) = 3m/12 * Z$
 $E_{max} = G2 * (L_{min}/2) + G1 * (L_{min}/2)$
 conversion 1m = 3.28'

Sample
Elev = 30m or 98.4'
Total length
6.5
16.4
60
9.84
16
<hr/>
108.74

Sample Driveway Calculations for Garage Downhill from Road



Sample Driveway Calculations for Garage Uphill from Road