Re-sealing and widening a 10m wide road

Task: How much does it cost for materials to widen and reseal 100m of road if the existing road is 10m wide. (Widen the road by 60cm)

Prior knowledge: Scale factors or ratio, area of triangle, rectangle, (parallelogram,), Volume of prisms, metric units.

Specifications
- Widen road by 60cm (i.e.: 30cm each side).
- 3% batter (slope) so water runs off it
- New top-seal must be a minimum of 150mm thick
- New Base layer on each side must be 300mm deep

Assumptions
- Old road is flat
- No need for new base under old road

Cost of materials
- $90 /m³ Top-seal
- $80 /m³ Base layer

Variations
- Make the new road flat
- New road is flat, with a edge of sloping base material outside the newly widened road lanes made of base material (a “run off” edge)

Design:
(Measurements in metres)

The triangle needs to go above the road by 150mm as the specifications have minimum of 150mm thickness. Base layer can be a right-angled trapezium, but increases materials

Area of Top-seal = triangle + Rectangle + parallelogram (small) x 2
= 2.34m²
Area of Base layer = parallelogram (large) x 2
= 0.18m²
Cost for 100m = 2.34 x 100m of road x $90 + 0.18 x 100m x $80
= $22 500

What costs have NOT been factored in?
- Transport of materials
- Labour and supervision
- Machinery and transporting machinery to site
- Design, consultation

Approximate costs for a 10m wide rural road is $450 per linear metre -> 100m costs $45 000