Cumulative Design Traffic in Million Standard Axles

Cumulative standard axle repetitions over the design life from present commercial traffic, growth rate, construction period, lane distribution and VDF.

Method: Compound-growth cumulative standard axles

Input parameters

Unit system: SI

Parameter	Value	Unit
Present commercial vehicles per day (both directions)	2,500.0	
Years from count to opening	2.0000	
Annual traffic growth	5.0000	%
Design life (years)	15.000	
Lane distribution factor	75.000	%
Vehicle damage factor (standard axles per vehicle)	3.5000	

Calculated results

Parameter	Value	Unit
Traffic at opening (vehicles per day)	2,756.2	
Growth factor over design life	21.579	
Cumulative standard axles (million)	56.985	

Notes for this case

• N = 365·A·[(1 + r)ⁿ − 1]/r·D·F, A = P(1 + r)ˣ. The damage factor F comes from axle load surveys and the fourth-power law; D is the share of commercial vehicles in the design lane, from the user's pavement code. The result feeds flexible and rigid pavement thickness design.

Formula and method

$$N_s = \frac{365A\left[(1+r)^n - 1\right]}{r}DF, \quad A = P(1+r)^x$$

Variables

P	Present commercial vehicles per day (both directions)	-
x	Years from count to opening	-
r	Annual traffic growth	-
n	Design life (years)	-
D	Lane distribution factor	-
F	Vehicle damage factor (standard axles per vehicle)	-
A	Traffic at opening (vehicles per day)	-
G	Growth factor over design life	-
N_s	Cumulative standard axles (million)	-

Method and standards

Design traffic.

Assumptions and limits

- Constant growth rate and damage factor.

References

Compound-growth cumulative standard axles

Report details

Report reference	FCC-97KE-AHE7 (the same inputs always give the same reference)
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/civil/roads/cumulative-design-traffic-msa

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.