where unreasonable costs or environmental constraints would dictate a lower LOS.

Level terrain is defined as a roadway on which trucks can maintain speeds that approach or are equal to those of passenger cars.

Rolling terrain is defined as a roadway on which trucks substantially reduce their speed below passenger cars on some sections.

Mountainous terrain is defined as a roadway where trucks operate at crawls speeds for long distances or frequent intervals.

Table 100.02 Relation of Conditions to Design Levels of Service		
Conditions		**Design Levels of Service**
RURAL		
Freeway	Flat	B
	Rolling	B
	Mountainous	C
Expressway	Flat	B
	Rolling	B
	Mountainous	C
Major Collector		
	Flat	B
	Rolling	B
	Mountainous	C
Minor Collector		
	Flat	C
	Rolling	C
	Mountainous	D
Local Access	Flat	D
	Rolling	D
	Mountainous	D
URBAN		
Freeway		C
Expressway		C
Arterial (Main Rd)		C-D
Frontage Road		D
Sector Road		D
DIRECTIONAL RAMPS		B-C

As an alternative to level of service D, consideration should be given to pairs of one-way roads or alternative bypass routes to improve the LOS.

For an approximation of the number of lanes required on a multi-lane freeway or expressway, use the following design year peak hour traffic volumes at the specified level of service:

Level of Service		Traffic Volume (Average Vehicles) Per Lane Per Hour
Urban	C-E	1400-2000
Rural	C-D	1000-1200

The following sections deal with the general capacity calculations for various roadways. Since these calculation methods are lengthy and beyond the scope of this document, the reader is referred to the Highway Capacity Manual (HCM), 1994.

104.01.01   Multi-lane Rural Roadway

The general equation for service volume of all multi-lane roadways is given by:
$$SV = 2000 \ N \ (v/c) \ T \ W$$
where:
- SV = Service volume (one direction) for a given level of service
- N = Number of lanes in each direction
- v/c = Service volume to capacity ratio
- T = Adjustment factor for trucks on grades
- W = Adjustment for width and lateral clearance

(See HCM Section 100.04.02)

104.01.02   Two Lane Roadways

Service volumes and capacities for two lane roadways are always both directions without regard to the distribution of volume by direction.

The general equation is given by:
$$SV = 2000 \ (v/c) \ T \ W$$
where:
- SV = Service volume in vehicles per hour (total both directions)
- v/c = Service volume to capacity ratio
- T = Adjustment factor for trucks on grades
- W = Adjustment for width and lateral clearance

(See HCM Section 100.04.02)