POPLIN ENGINEERING
ENGINEERING ANALYSIS OF ACCIDENTS

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RECONSTRUCTION EQUATIONS

(Specific Units Version)

WITH UNITS - a_d (mph/s), S (mph) , L (feet), t (sec) -Note: these equations assume positive deceleration
a_d - deceleration, L - travel length, S_i - Initial Speed, S_f - Final Speed, t - time

TO SOLVE	USING	EQUATION
Time (t) (secs)	a_d S_i S_f	$t = \frac{S_i - S_f}{a_d}$
deceleration (a_d) (mph/sec)	t S_i S_f	$a_d = \frac{S_i - S_f}{t}$
	L S_i S_f	$a_d = \frac{0.735 (S_i^2 - S_f^2)}{L}$
Initial Speed (S_i) (mph)	a_d t S_f	$S_i = S_f + a_d t$
	a_d t L	$S_i = \frac{0.682 (L)}{t} + \frac{a_d t}{2}$
	a_d S_f L	$S_i = \sqrt{S_f^2 + 1.364\ a_d L}$
Final Speed (S_f) (mph)	a_d t S_i	$S_f = S_i - a_d t$
	a_d S_i L	$S_f = \sqrt{S_i^2 - 1.364\ a_d L}$
Length (L) (feet)	t a_d S_i	$L = 1.47\ t\ (S_i - 0.5\ a_d t)$
	a_d S_i S_f	$L = \frac{0.733 (S_i^2 - S_f^2)}{a_d}$
	t S_f L	$L = 0.733\ (t)\ (S_i + S_f)$

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RECONSTRUCTION DECELERATIONS

Accelerations and decelerations can be expressed in units of:
miles per hour per second (mph/s).

TYPICAL DECELERATIONS

On reasonably level terrain, maximum braking will typically decelerate vehicles at the following levels:

Dry Pavement:

Tractor Trailers/Heavy Trucks	10 - 12 mph/s
Automobiles/Pickup/Vans/SUVs	15 - 18 mph/s

Wet Pavement:

Tractor Trailers/Heavy Trucks	8 - 12 mph/s
Automobiles/Pickup/Vans/SUVs	8 - 15 mph/s

Off road, on firm level soil, grass or gravel

All vehicles decelerate at approx. 10 mph/s

Vehicles rolling, sliding on the sides/roof or rotating (without braking) on level terrain or pavement.

All vehicles decelerate at approx. 10 mph/s

Comments are appreciated. For comments or additional copies, please e-mail wp@wpoplin.com