Hazardous Roads

By Debbie C., John K., and Mike E.

Road Hazard

Photo by Mike Edwards

The intersection of Ridge Road and Dry Run Road is a local hazard.

Our advocacy group has monitored the problem for six months and would like to propose a solution based on our research and the laws of motion. If nothing is done to correct this problem, more accidents or possible fatalities are likely to occur.

Intersection Features

- Dry Run Road forms a T-intersection with Ridge Road
- To the right of Dry Run Road,
  Ridge Road curves giving an approximately 150 ft. view
- Speed limit on Ridge Road is 55 mph
- Three accidents have occurred there in the past five months

"I'm always afraid when I pull out onto Ridge Road from Dry Run Road. I wish they would do something." - **driver quote**

How do the laws of motion describe everyday events?

Newton's Laws allow us to describe the location, direction, and time of many everyday events. They help make the world understandable.

Can the motion of any object be predicted?

Everything might not be predictable, but the real world made of objects like cars and trucks and how they stop and go are very predictable.

Braking Distance

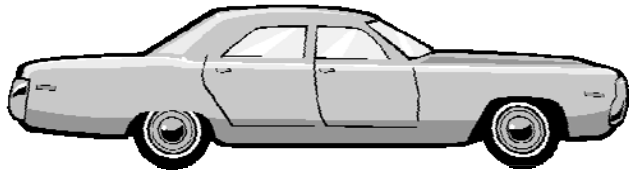
Determined primarily by work of the brakes, velocity of the car, and road conditions

$$\text{Work}_{\text{fric}} = -\mu mgd = -\tfrac{1}{2}mv_o^2$$

where μ is the coefficient of friction
m is the mass of the car
g is the acceleration of gravity
d is the distance needed to brake
v_o is the initial car velocity

Braking Distance (continued)

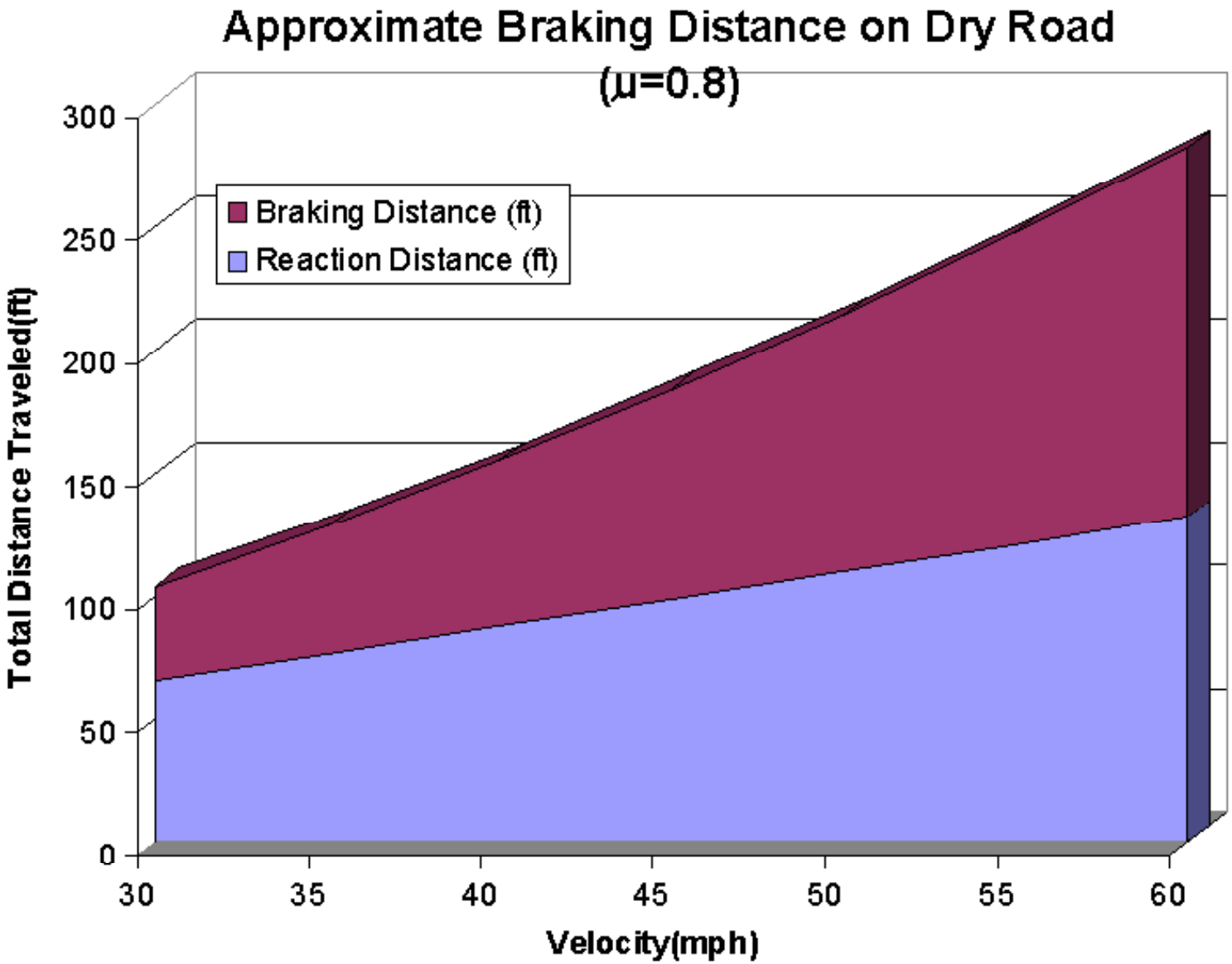
This simplifies to:



$$d = \frac{v_o^2}{2\mu g}$$

μ is usually measured to be 0.8 on dry roads, but drops if the road is wet

Since v_o is squared, doubling the speed, quadruples the braking distance



Proposal to Change Intersection

As shown by the previous graph, the intersection may be made safer at very little cost if the driver reaction time is increased and stopping time is decreased.

This would be achieved by the following:

- Trees next to road should be trimmed to allow better visibility.
- Speed limit on Ridge Road should be changed from 55 mph to 35 mph near this intersection.

References

Nave, R. "Stopping Distance for Auto." Hyperphysics. 2005. <http://hyperphysics.phy-astr.gsu.edu/hbase/crstp.html>.

"Stopping Distance." Safe Drive Training. 2004.<http://www.sdt.com.au/STOPPINGDISTANCE.htm>.

Memmer, S and J. Helperin. "Keep Your (Braking) Distance: More Than Just Slowing Down." 2000. <http://applications.edmunds.com/ownership/driving/articles/43810/article.html>.

Clip Art from Microsoft Office