The Speed/Time/Distance *Relationship*

The Speed/Time/Distance relationship is important when considering the cause of a traffic accident. When two or more vehicles try to occupy the same space at the same time, an accident occurs. If the speed of either vehicle had been different as they approached, the impact may not have occurred. *Understanding the relationship between the speed of the vehicle and the distance it covers as it approaches is essential to determining whether the vehicle's excessive speed is a contributing factor to the accident.*

First things first. We need to convert all of the variables (speed, time and distance) to common units. Using the USA system, feet and seconds are the norm. The distance used in our calculations is in feet and the time is in seconds. So instead of miles/per/hour start thinking in terms of feet/per/second. Since there are 5,280 feet in 1 mile and 3,600 seconds in 1 hour, changing MPH to FPS is converted as follows:

Divide 5,280 feet by 3,600 seconds and then multiply the answer by the MPH, to convert it to feet/per/second. For instance, 1 MPH is the same as 5,280 feet/3,600 seconds or 1.467 FPS (feet per second). This leaves us with a conversion factor of 1.467 to change MPH to FPS. If a vehicle is traveling at a constant 30 MPH, it will travel 44 feet every second. This will also convert FPS back to MPH.

Example:

$$(30 \text{ MPH})(1.467) = 44 \text{ FPS}$$
$$\text{OR}$$
$$44 \text{ FPS} / 1.467 = 30 \text{ MPH}$$

If a vehicle is being accelerated as in pulling from a stop sign or decelerated as in braking to a stop, the rate at which the vehicle covers a certain distance over a given time is changing. As in a vehicle pulling from a stop sign, the distance the vehicle travels the first second is far less than the distance it covers the third or forth second.

Just how fast that vehicle is changing speed in respect to time is referred to as the vehicle's acceleration rate. If it is slowing down, it has a negative acceleration rate and if it is speeding up, it has a positive acceleration rate. An average to rapid acceleration rate for a passenger car is approximately 5 to 10 feet/second/second. This equates to a .15 to .3 acceleration factor.

When determining a distance, time or ending velocity, the following formula's can be used:

$d = (Vi)t + (.5)a(t)(t)$
$t = (Ve-Vi)/a$
$Ve = $ the square root of $[((Vi\ (Vi)) + (2)(a)(d)]$

d = distance in feet
Vi = velocity initial in feet per second
Ve = velocity ending in feet per second
t = time in seconds
a = acceleration rate in feet/second/second
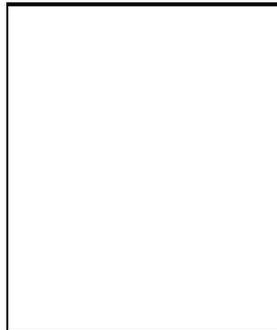
VCE, Inc.'s
Tips of the Trade

Structural Examinations

We are frequently called upon to examine various types of foundation wall problems. Usually these problems exist in concrete block type foundation walls commonly used for houses as well as commercial buildings. The problems encountered range from minor settlement cracking to partial or complete failure of the foundation wall.

A common type of distress seen in concrete block foundation walls is horizontal cracking along with inward deflection or "bulging in" of the wall. The cracking often occurs soon after the backfill material has been placed, although, under some conditions, problems develop months or even years after construction. Now, what generally is the cause of these problems? Frequently, the first sign of distress is that horizontal cracking develops in the mortar joints and inward bulging occurs. If the horizontal cracking is found to be a distance of 1/2 to 2/3 of the wall height from the floor, this is a clear indication of an under designed wall. An experienced structural engineer will then determine if the wall is filled or unfilled as well as the type of reinforcement, if any. It is not uncommon for problems to develop after a long period of successful service. Always look for changes in the drainage pattern behind the wall if problems develop long after construction.
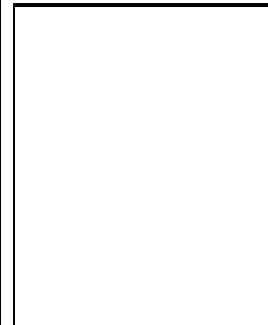
The wall seen in the photograph failed only two days after backfilling and after a period of rainfall that saturated the soil. The wall is just under 10 feet in height and is constructed using 12-inch thick hollow concrete blocks. This is a clear example of an under designed wall.

Clarence Bennett

Products Liability

"Time is of the essence"

Investigations of product failure or malfunction may be adversely affected by a long time lapse between the incident and investigation.

Herb Stewart

In several recent cases, investigation by VCE, Inc. was severely hampered by long time delays.

In one case, an alleged automobile brake failure was submitted to VCE for inspection three years after the accident. It was apparent that the rotor calibrator assembly had been exposed to the elements for an extended period of time that was evidenced by heavy rusting of the parts.

In another case involving a large property loss, a critical piece of evidence was disposed of by the Insured. The loss had occurred one year prior to VCE's involvement. It is likely that a good case could have been made for subrogation if the part had been available.

In another case, subrogation was possible because of early investigation of the cause of failure. In this case, VCE was on the scene two days after a plumbing failure. It was therefore possible to properly document all of the evidence surrounding the claim.

Don't FORGET that VCE, Inc. has the ability to download
Crash Data Recorder information
from GM Vehicles.

Check out the currently supported vehicles on our Forensic Investigations Link and go to Crash Data Retrieval Systems.

www.vceinc.com

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The Speed/Time/Distance Relationship

As seen in diagrams A & B, if the speed/time/distance relationship between the two approaching vehicles change by as little as 5 MPH, the accident would not have occurred.

With V2 traveling at a constant 35 MPH, the accident would have occurred, but if it were traveling at only 30 MPH, the vehicles would not have collided.

This type of an analysis is helpful to determine whether excessive speed was a factor in the accident. For further details on the speed/time/distance approach in reconstructing traffic accidents, contact VCE, Inc. at 615/781-3844 or toll free at 1-800-747-3844.

by Todd Hutchison / ACTAR Certified
Accident Reconstructionist

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