

Virginia Commonwealth University
Transportation Safety Training Center
Virginia Multi-disciplinary Crash Investigation Team

Report Number 205 – August, 2008

ABSTRACT

The crash described in this report occurred when an elderly woman attempted to cross a four lane divided primary highway, in a congested urban area, and stepped into the path of a tractor trailer. The tractor trailer, with insufficient time to stop, struck the woman in the travel lane, resulting in her death.

This crash illustrates the potential impact of diseases such as Alzheimer's disease, which may have caused the pedestrian to become disoriented while attempting to cross the roadway. The report also addresses factors affecting driver perception and reaction. With regard to roadway features, the lack of pedestrian control measures such as crosswalks and pedestrian phases at signalized intersections in this area are discussed.

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SYNOPSIS

Day, Time, Season: Tuesday, 8:57 p.m., Winter

Road/Weather: Urban primary road; clear and dry conditions

Vehicles Involved: 2003 Model 8000 Volvo tractor with a semi-trailer and a full trailer

Summary: Pedestrian stepped from median into the path of the tractor.

Severity: One fatality, minor property damage to the tractor

Probable Cause: Pedestrian crossing road not at an intersection, possible mental confusion attributable to Alzheimer's disease

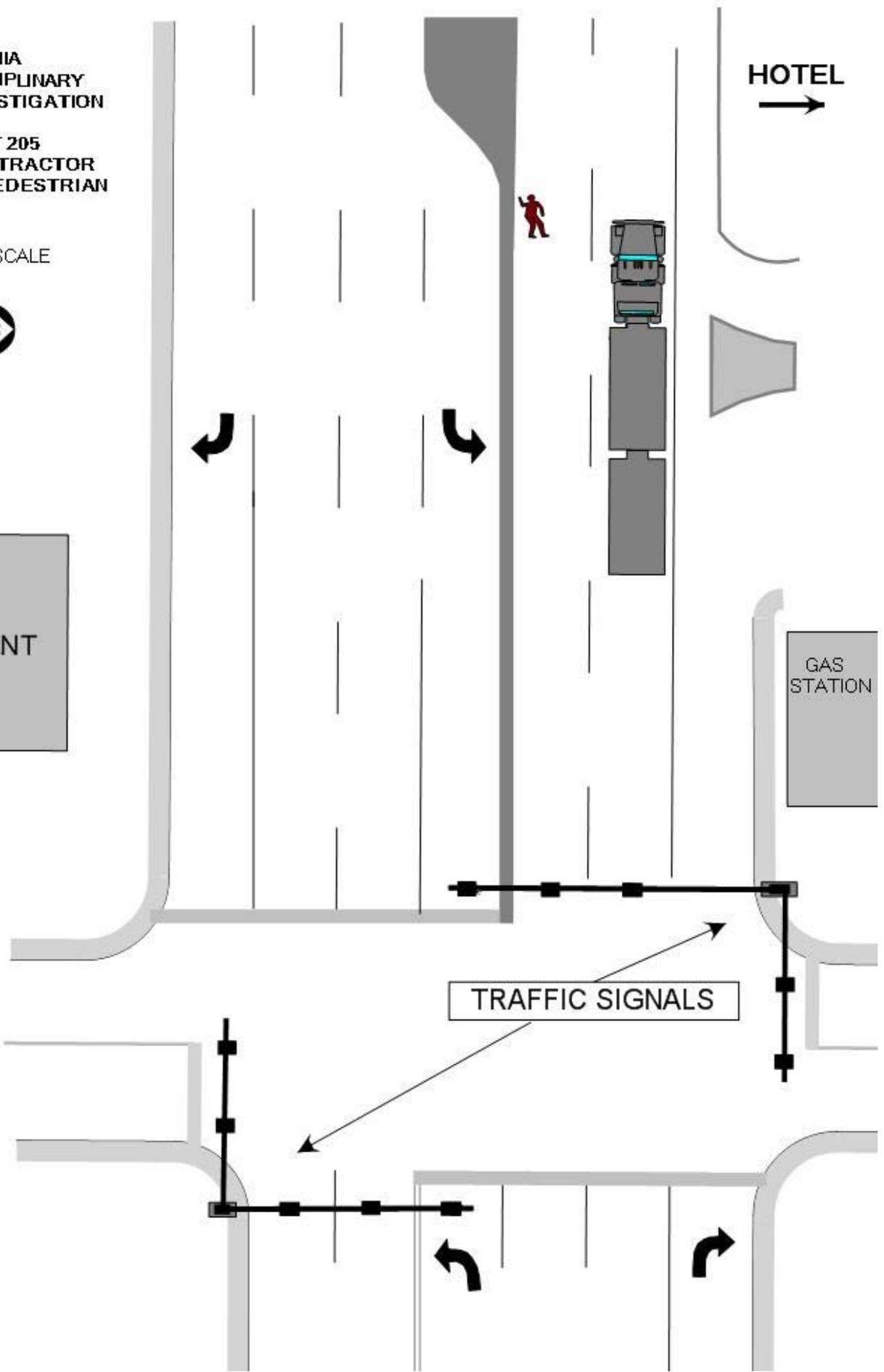
Significant Points: Marking and maintenance of intersections on high traffic volume urban roads, pedestrian phases at signalized intersections, effects of Alzheimer's disease and other dementia-type disorders on decision-making, pedestrian visibility.

VIRGINIA
MULTI-DISCIPLINARY
CRASH INVESTIGATION
TEAM
REPORT 205
2003 VOLVO TRACTOR
TRAILER VS PEDESTRIAN

NOT TO SCALE



HOTEL
→



TRAFFIC SIGNALS

CRASH DESCRIPTION

At 8:57 p.m., on a clear dry evening in winter, a 72 year old man and his 69 year old wife were crossing an urban highway mid-block, west of an intersection with a two lane road. The road is a major four lane east-west primary route located in a retail business area. Each lane is approximately 12 feet wide and the eastbound and westbound lanes are separated by a 2 foot concrete median at the location of the fatality. There are left and right turn lanes on both east and west approaches to the signalized intersection site, including the segment of highway the couple was crossing. The pavement is asphalt and is in poor condition. The road is controlled by pavement markings, signs and traffic signals. The pavement markings are in poor condition. However, snow plowable reflective pavement markers are installed to help delineate the roadway at night and during inclement weather. There is no overhead lighting. The speed limit is 45 mph.

The couple had just finished eating at a fast food restaurant and was returning to their hotel across the street. Rather than walk east to the intersection, they traversed the parking lot and crossed the eastbound lanes in the middle of the block, directly across from their hotel entrance. Upon reaching the concrete median, the husband continued across the westbound lanes. His wife, however, stopped and remained on the median.

A 37 year old male was driving his employer's 2003 Model 8000 Volvo tractor, pulling a loaded semi- and full trailer and travelling westbound in the right lane. He had picked up a load of miscellaneous freight about forty-five minutes earlier and was driving his usual route to a destination across the border of an adjacent state. It is unknown if he was wearing his seat belt. The driver had just travelled through a bypass section of this primary route and re-entered the urban stretch. He had gone through one signalized intersection and approached the second. The fast food restaurant was on the far left corner of this intersection and a shopping center entrance formed the right leg of the intersection. The driver reported looking to his right because, despite the darkness, a vehicle with no lights on was approaching the shopping center exit. He was concerned that it might pull out in front of him.

As he continued forward, the tractor driver looked forward and saw the woman in the road, directly in his path. He braked hard, but was unable to avoid striking her with the left front corner of the tractor. The pedestrian was propelled into the left lane, landing near the median. The truck skidded to a stop, with minor damage to its left headlight and grill area. The exact

location of the first contact was not known—the trailer came to rest over that area of the roadway and no identifying marks were noted when it was moved.



***Photo #1: View facing east, looking at approaching westbound traffic.
Tractor was in outside through lane.***

Several witnesses immediately notified authorities of the crash. One witness, a registered nurse, began checking the victim for injuries and assisting her until medical help arrived. When police arrived on the scene, they closed both westbound lanes, diverting traffic onto the eastbound side of the median, with one lane designated for travel in each direction. Emergency workers treated the victim, but the pedestrian died from head and chest trauma less than 20 minutes after she was struck. A local Medical Examiner was notified and authorized removal of the body to a nearby hospital for examination. After police examined and photographed the tractor trailer, it was released to the company owner and towed to their site for further evaluation and damage assessment. They concluded their at-scene investigation and re-opened the two westbound lanes to traffic approximately 3-1/2 hours after the crash.

REMARKS

The woman killed in this crash was returning to her home in a northern state after spending the previous three weeks visiting a southern state. She and her husband had driven approximately 400 miles that day, taking frequent breaks along the way. The couple had decided to stop for the night and planned the next day to visit a family member who had just given birth. She lived about 25 miles from their hotel.

After checking into their room, the couple decided to go out for dinner. Their hotel was located in the middle of the block, so they walked to the intersection and crossed at the traffic signal. During an interview, the husband recalled that they had to cross quickly because the traffic was heavy. Vehicles on the north/south legs of the intersection were turning onto the east/west primary road while they were attempting to make their way to the other side. At the restaurant, the couple ordered and ate their meal; the husband remembered that his wife seemed fine. As they were heading back to the hotel, they decided to cross mid-block, to avoid being rushed. Both crossed the eastbound lanes and stopped together midway, standing on the concrete median. After looking and deciding that they had plenty of time to cross the westbound lanes, and believing that his wife was still beside him, the husband walked forward. Upon reaching the other side of the road, he realized that she had not come with him. He turned, but she had already been struck by the tractor, which blocked his view.

The tractor driver, a 37 year old male, had been travelling about 45 minutes during the first part of his normal delivery route from a nearby city, heading west into a nearby state. He carried miscellaneous freight in both trailers. After driving through the bypass section of the primary highway, he entered the urban area, driving through the first of several signal-controlled intersections. He reported that he was travelling about 35 mph, 10 mph below the posted limit. This was supported in witness statements and there was no evidence that contradicted the reports. As he approached the intersection that precedes the crash site, the tractor driver stated that he glanced to his right because he noticed a white pickup truck, without headlights burning, which looked like it might pull into his path. When he looked forward again, he "saw the woman stop in the middle of the road in front of my truck." He indicated that he had not seen her prior to glancing to his right and that, when she stopped, she put her hands up, but did not take any evasive action to avoid being struck. Although the tractor driver braked heavily, leaving skid marks prior to striking the pedestrian, he was unable to avoid the collision.



Photo #2: View facing westbound, in the direction tractor was traveling.

In interviews with investigating officers and with a member of the Virginia Multi-disciplinary Crash Investigation Team (VMCIT), the victim's husband indicated that his wife suffered from Alzheimer's disease, a degenerative brain disorder that leads to dementia and other cognitive dysfunctions. In early stages of the disease, individuals may have difficulty assimilating new information, and they may get lost going to familiar places. As the disease advances to moderate levels, they may struggle with simple everyday tasks, become restless and wander, or even hallucinate. They may exhibit an inability to reason clearly when making decisions. In this case, the husband stated that his wife had been diagnosed about four or five years earlier but that her condition had worsened significantly over the past year. Doctors had warned him that she was likely to lose most of her memory within the next year. Three weeks prior to the crash, they had placed her on a medication designed to improve some of the problems related to learning and memory. He described her main symptoms, occasional bouts of confusion and word loss, as brief episodes that passed quickly. She did not appear to be sad or depressed. Her driver's license was active and she continued to drive in her home town,

although others told him that she had become lost several times. She had stopped sharing the driving time when the couple travelled together, preferring that he drive, and he felt that she would not have passed the driving test which she was due to take shortly after they returned home.

The victim's husband believed that she had experienced an episode of confusion and disorientation while they were crossing the road. Although she had not exhibited any problems during dinner, he could not find any other reason for her failure to maintain pace with him as they began to cross the second set of lanes. He stated that they had plenty of time and he was not rushed. His regret was that he did not take his wife's hand to physically lead her to safety. The episodic nature of her symptoms, when combined with the fact that the woman was in an unfamiliar setting that placed challenging, unusual demands on her mental faculties, lends support to his belief that she had a moment of confusion that led to her fatal actions. With her potentially diminished reasoning, she may not have understood that the tractor was approaching until it loomed directly in her visual field.

The fact that the couple chose to cross the busy primary road in the middle of the block was an issue of concern. Their hotel is located mid-block, directly across the busy primary highway from the parking lot behind the restaurant they had chosen for dinner. The intersection east of the couple's hotel is an active and potentially dangerous one. In addition to the four lanes of through travel for the primary legs of the intersection, the two approaches have both right and left turn lanes. The right turn lane on the westbound leg forms the entrance to a shopping center containing a grocery store and other retail outlets, including a fast food restaurant. At the front of the shopping center, on the southwest corner of the intersection, a gas station with entrances on both the primary and the secondary crossroad expose pedestrians to vehicles pulling in or out of the traffic flow. To reach the intersection from the motel, pedestrians must cross the gas station entrance. To then access the opposite side of the primary route, they must wait for the signals to stop traffic on the primary lanes and watch for vehicles turning left or right from the crossroad into their path of travel. There are no pedestrian pushbutton detectors or signal heads that would indicate when it is appropriate to walk, and the intersection is not marked to provide crosswalks and create a safe zone of passage. During an interview, the surviving pedestrian stated that they had crossed at the intersection on their way to dinner but that he had felt rushed. His discomfort led to the decision to cross mid-block on the return trip, where there were only two directions of vehicular movement to consider and navigate.



Photo #3: View across the primary highway in the area the pedestrians crossed to return to their hotel.

In general, pedestrians have the right of way if they cross at an intersection with a green traffic signal in their direction of travel, but they are not required by law to cross at intersections. The Code of Virginia (2007) section 46.2-923 states: “Where intersections contain no marked crosswalks, pedestrians shall not be guilty of negligence as a matter of law for crossing at any such intersection or between intersections when crossing by the most direct route.” This city’s municipal code did not expand upon the Code with regard to pedestrian actions. Officials at the city Department of Public Works and the Police Department indicated that they had been concerned with pedestrian traffic on this section of roadway. In addition to preparing to address the lack of crosswalks and pedestrian phases on the signals, they advised that the city has requested the power company provide a cost estimate on installing overhead lighting at this intersection.

The stretch of roadway is not lighted, making visibility a potential issue at night. Although ambient illumination from the retail businesses is present, this may distract drivers

passing through the area more than it aids them in seeing other vehicles and/or pedestrians in the roadway. The issue of visibility played a role in this crash. The pedestrian was wearing a light colored (but not reflective) jacket and dark pants that night. Although she should have been visible to some extent, she was not highly conspicuous. The tractor driver did not report seeing her as he approached the intersection. However, a vehicle approaching the intersection to his right drew the driver's attention away from the forward area. He was concerned about the fact that this other vehicle's headlights were off and he anticipated it might run the red light, turning or crossing in front of him. With his vision and attention focused to his right, the pedestrian in the median would only have been observed with the left area of his peripheral vision, if sensed at all. The pedestrian's timing, when she stepped into the moving tractor's lane, left the driver little time to react and slow his massive vehicle. His skid marks began shortly after he passed through the intersection, continuing through the area of impact to his position at final rest. Due to tire mark degradation, members of the VMCIT were not able to identify where the skids began and ended or relate them to specific tires on the vehicle. Consequently, it was not feasible to calculate a speed estimate using skid to stop formulas.

The 37 year old tractor driver had been on the road for about 45 minutes prior to the crash. He was beginning his normal evening route, transporting miscellaneous freight from a nearby urban area to a bordering state. He was familiar with the roadway and with his vehicle. This individual had a valid commercial driver's license. His driving history showed that he had been convicted of driving 10-14 mph above the posted 55 mph limit over two years prior to the crash and that he had been convicted of operating with improper equipment a year later. He had completed a driver improvement clinic a year before the crash, and the Virginia Department of Motor Vehicles reported that he had a driver point balance of +5. There was no indication that the driver was fatigued, under the influence of alcohol or drugs, or had any deficiencies at the time of the crash.

The tractor suffered little damage as a result of striking the pedestrian, as would be expected from the size and mass differences. Although the VMCIT was denied direct access to the vehicle, photographs taken at the scene revealed that the left front headlight was cracked and a portion of the lens was missing. In addition, there was slight damage to the left side of the grill and a crack on the front of the hood, between the grill and the left headlight. This damage was consistent with a pedestrian impact at that point on the vehicle. In addition, when the hood was

raised, one of the pedestrian's shoes was found lodged behind the left portion of the bumper. Her other shoe was located underneath the semi-trailer at final rest.



Photo #4: Left front bumper of tractor showing damage to headlight and hood.

RECOMMENDATIONS

1. The city Department of Public Works should:
 - a. Repave and remark the road,
 - b. Install crosswalk lines at this intersection,
 - c. Install pedestrian signal heads and detectors,
 - d. Erect PEDESTRAIN CROSSING signs to direct them to the crosswalk,
 - e. Conduct an engineering study to determine if additional safety features are warranted; e.g. speed limit reduction, geometric changes, installation of sidewalks,
 - f. Install guardrail (westbound lane) in front of the motel. Although the lack of guardrail was not a factor in this crash, it would prevent vehicles from running into the deep drainage ditch just beyond the shoulder.

2. The Virginia Department of Motor Vehicles (DMV), the Department of Health (DOH), and the Department of State Police should continue to stress the importance of pedestrian safety.
 - a. Pedestrians should be encouraged to wear light or reflective clothing and cross roads at designated locations in accordance with traffic laws and regulations. They also should be encouraged to maintain vigilance when walking near any roadway.
 - b. Drivers should always be vigilant to the potential of pedestrian traffic. In urban areas, signage and public safety media campaigns can be used to emphasize this message.
 - c. The city Communications Department should consider conducting a public relations campaign relating to pedestrian safety. Ideally, this would be coordinated with the many businesses along this road.

3. The DMV, the DOH and physicians treating patients with cognitive impairments such as Alzheimer's disease should work towards educating the public about the effects of such diseases, especially with regard to how they may interfere with an individuals' ability to perform normal everyday tasks, including driving and walking in areas with motorized traffic.
 - a. Licensed individuals with such degenerative illnesses should be closely monitored to ensure that they can consistently operate motor vehicles safely and, when their impairment puts them or others at potential risk, they should cease driving. Referral to the DMV for medical review may be appropriate for individuals who do not voluntarily suspend driving despite impairment.
 - b. Physicians and other health care professionals should educate caregivers about the need for closer supervision of individuals whose cognitive impairments are advancing, along with methods to help manage their behavior (such as providing gentle guidance in potentially dangerous situations) and help keep them safe.